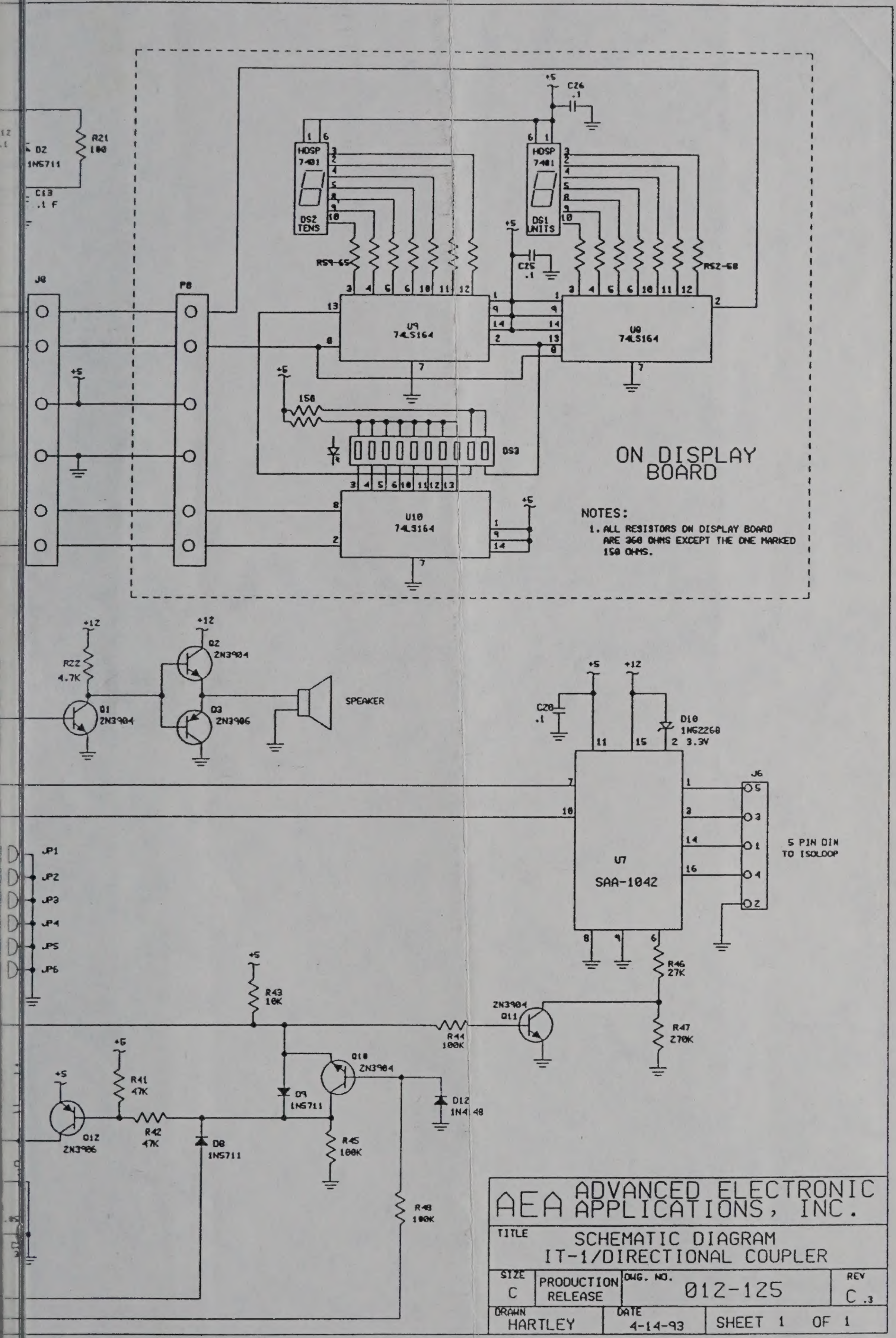


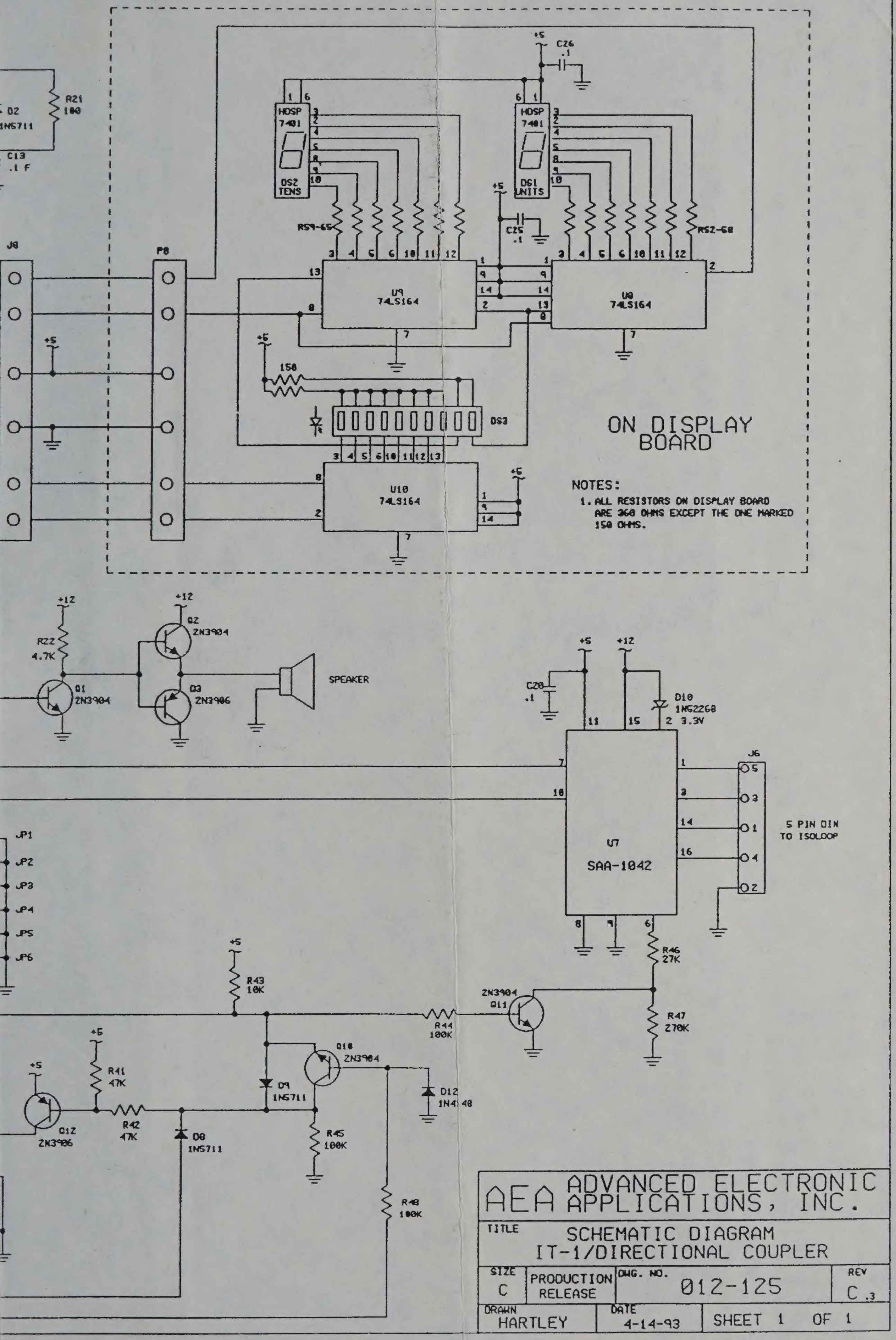
NOTES:

1. ALL RESISTORS ON DISPLAY BOARD ARE 360 OHMS EXCEPT THE ONE MARKED 150 OHMS.

AEA ADVANCED ELECTRONIC APPLICATIONS, INC.

TITLE SCHEMATIC DIAGRAM
IT-1/DIRECTIONAL COUPLER

SIZE C
PRODUCTION RELEASE
DWG. NO. 012-125
REV C .3
DRAWN HARTLEY
DATE 4-14-93
SHEET 1 OF 1



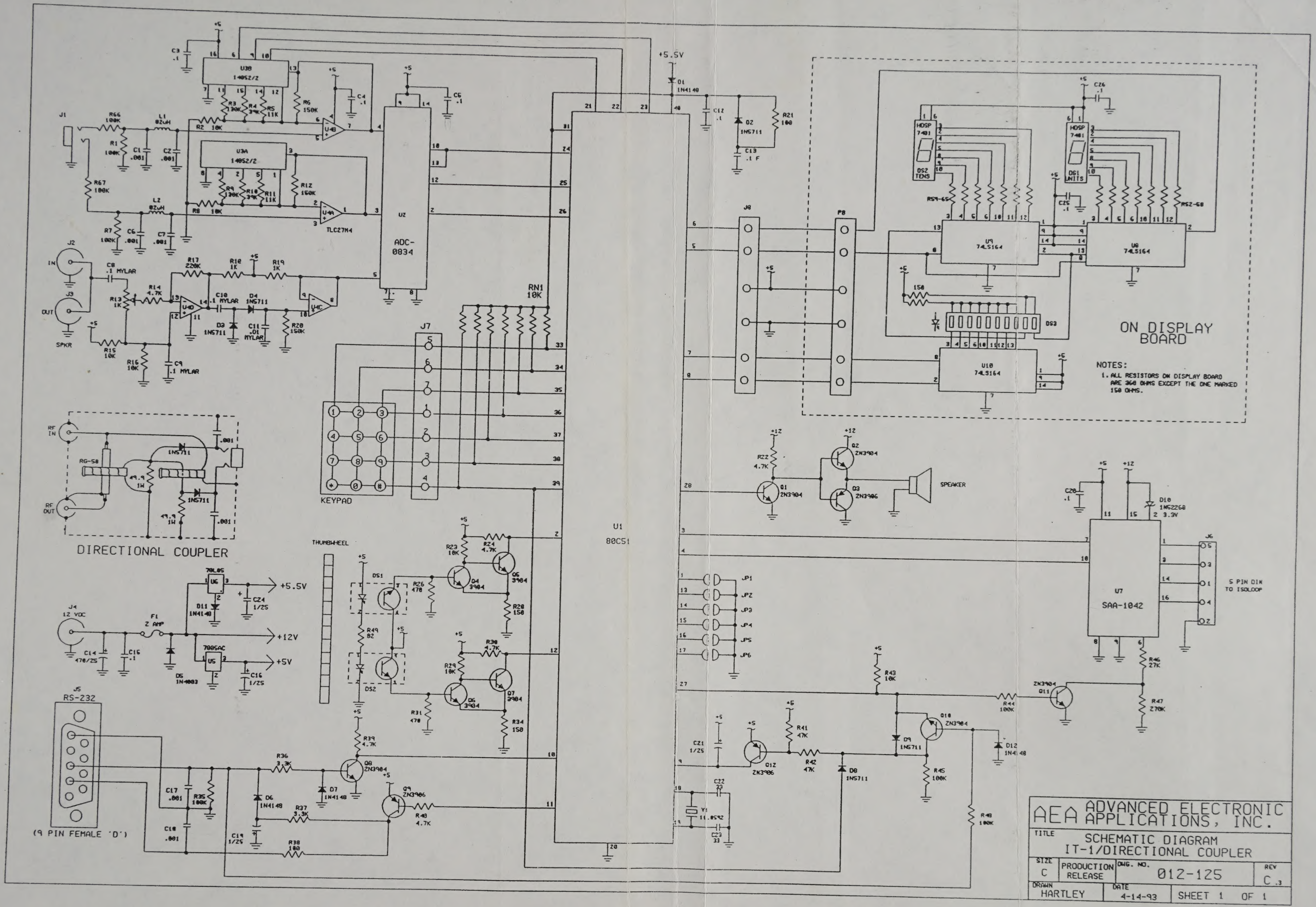
ON DISPLAY BOARD

NOTES:

1. ALL RESISTORS ON DISPLAY BOARD ARE 360 OHMS EXCEPT THE ONE MARKED 150 OHMS.

AEA ADVANCED ELECTRONIC APPLICATIONS, INC.

TITLE	SCHEMATIC DIAGRAM IT-1/DIRECTIONAL COUPLER		
SIZE C	PRODUCTION RELEASE	DWG. NO. 012-125	REV C .3
DRAWN HARTLEY	DATE 4-14-93	SHEET 1 OF 1	



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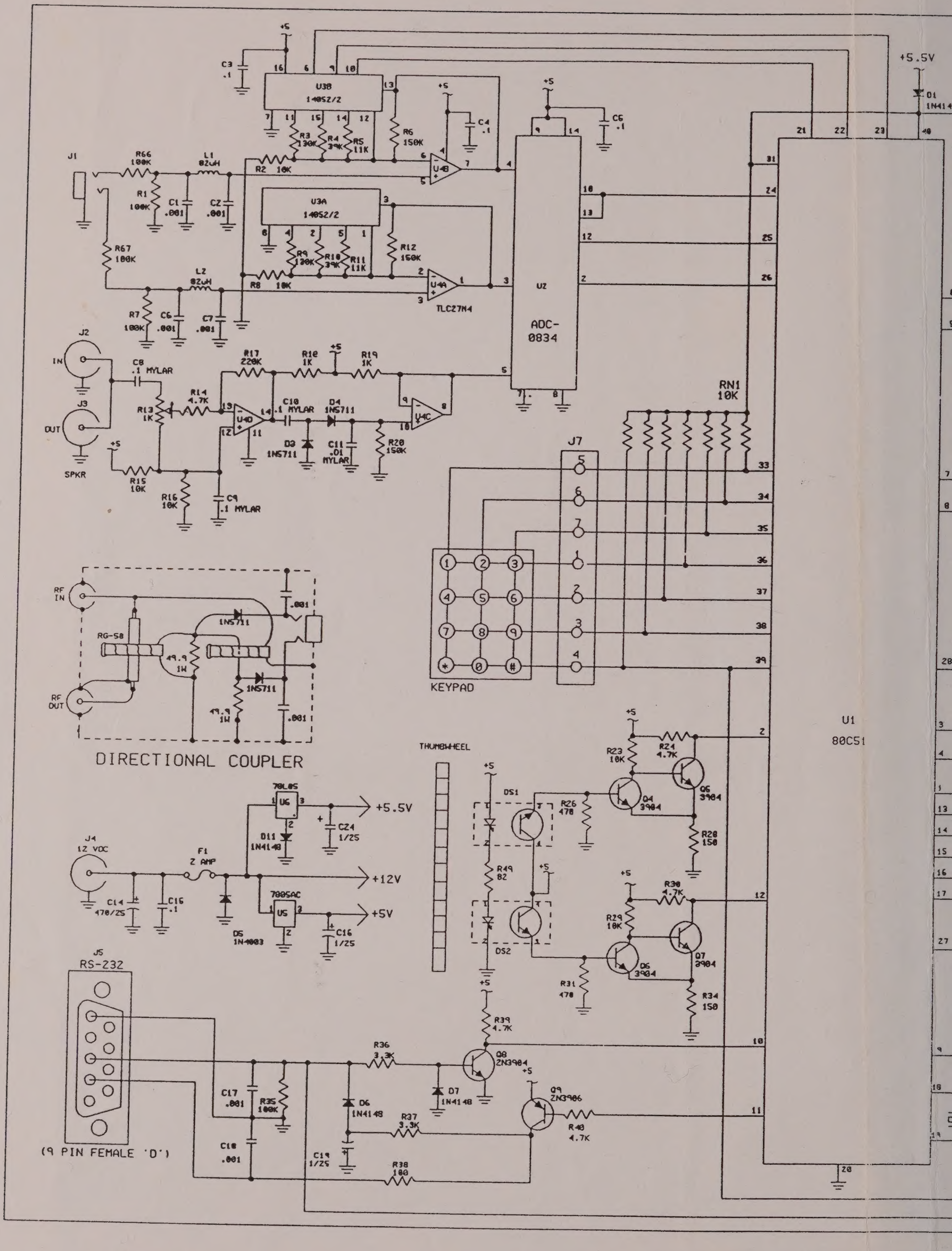
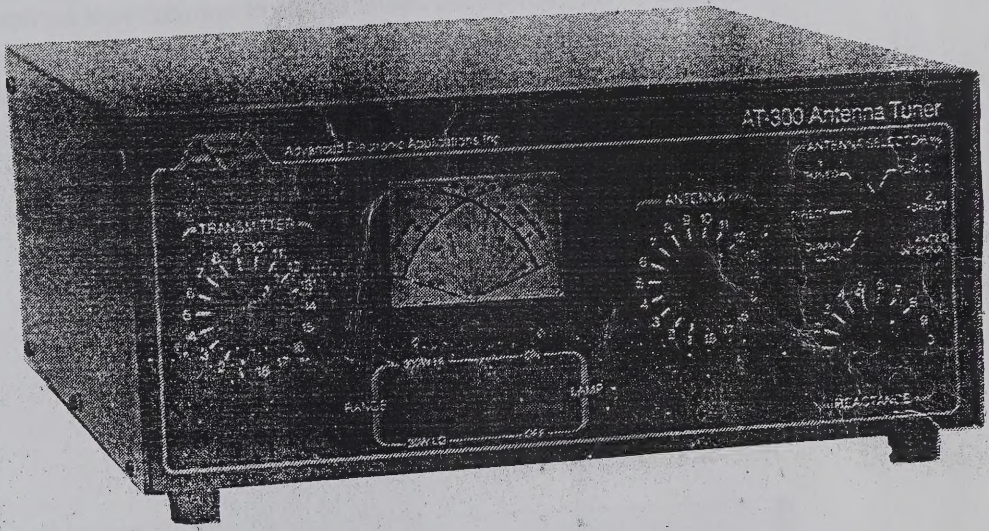


+5
C3
.1
16
6
9
10
U3B
14052/2
13
7
11
15
14
12
R3
130K
R4
39K
R5
11K
R6
150K
+5
C4
.1
U4B
+5
C5
.1
+5.5V
D1
1N414
21
22
23
40
J1
R66
100K
L1
82uH
R1
100K
C1
.001
C2
.001
R2 10K
U3A
14052/2
R12
150K
R9
130K
R10
39K
R11
11K
R67
100K
L2
82uH
R8 10K
U4A
TLC27N4
R7
100K
C6
.001
C7
.001
U2
ADC-
0834
31
24
25
26
J2
IN
C8
.1 MYLAR
J3
OUT
SPKR
R17
220K
R18
1K
R19
1K
R14
4.7K
R13
1K
U4D
U4C
C10
.1 MYLAR
D4
1N5711
D3
1N5711
C11
.01
MYLAR
R20
150K
R15
10K
R16
10K
C9
.1 MYLAR
RN1
10K
J7
KEYPAD
33
34
35
36
37
38
39
RF IN
RF OUT
RG-58
1N5711
49.9
1W
.001
DIRECTIONAL COUPLER
THUMBWHEEL
78L05
U6
+5.5V
C24
1/25
D11
1N4148
J4
12 VDC
F1
2 AMP
+12V
7805AC
U5
+5V
C14
470/25
C15
.1
D5
1N4003
C16
1/25
DS1
R26
470
R49
82
DS2
R23
10K
R24
4.7K
Q4
3904
Q6
3904
R28
150
R30
4.7K
R29
10K
Q5
3904
Q7
3904
R31
470
R34
150
U1
80C51
J5
RS-232
(9 PIN FEMALE 'D')
R39
4.7K
Q8
2N3904
R36
3.3K
D7
1N4148
C17
.001
R35
100K
D6
1N4148
R37
3.3K
Q9
2N3906
R40
4.7K
C18
.001
C19
1/25
R38
100
2
12
10
11
20

AT-300

HF Antenna Tuner

Owner's Manual



FOREWORD

Congratulations on choosing the Advanced Electronic Applications AT-300 HF Antenna Tuner to enhance your station's performance.

The AT-300 is another quality product developed by AEA where **Engineering Makes the Difference.** It should provide you with years of operating enjoyment.

To fully enjoy the benefits of the AT-300 HF Antenna Tuner please read this owner's manual thoroughly before operating the unit. If you have any questions, I encourage you to contact an AEA authorized dealer or one of our technical service representatives at:

Advanced Electronics Applications, Inc.
P.O. Box C2160
Lynnwood, WA 98036-0918
(206)775-7373
FAX (206)775-2340
TELEX 6972496 AEA INTL UW

73,

C. Mike Lamb N7ML
President
Advanced Electronic Applications

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1. FEATURES

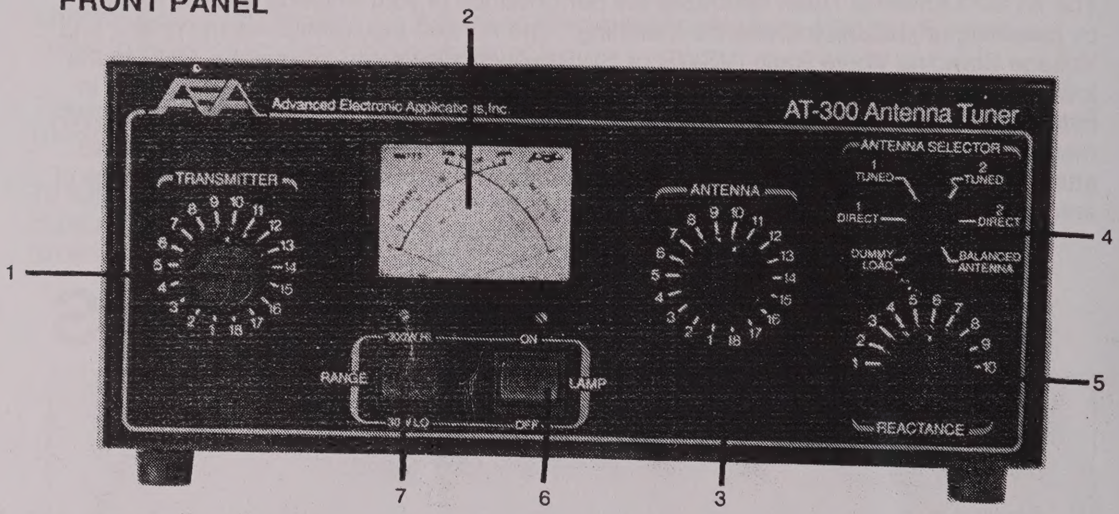
The AT-300 Antenna Tuner optimizes the performance of your antenna and transmitter by providing adjustable impedance matching. The AT-300 also measures the power and Voltage Standing Wave Ratio (VSWR or SWR) which allows you to tune the SWR to the lowest ratio possible for the selected transmission frequency. With ease of operation in mind, the AT-300 also features a precision-frequency compensated dual-movement SWR meter and adjustable high/low power selector. The low-pass design provides harmonic attenuation for lower TVI potential. This also enables you to match a much wider range of antenna impedances.

2. SPECIFICATIONS

FRONT PANEL INDICATORS AND CONTROLS	
Meter	Dual-movement D'Arsonval cross needle power and SWR meter
CONTROLS	
Transmitter Tuning	18 position
Antenna Tuning	18 position
Reactance	Continuous
Antenna Selector	6 position: Antenna 1 tuned and tuner bypass, antenna 2 tuned and tuner bypass, dummy load (external) and balanced antenna
Power Switch	2 position high/low
Lamp	Light control for meter
REAR PANEL CONNECTORS	
Antenna 1	SO239 connector
Antenna 2	SO239 connector
Dummy load	SO239 connector
Transmitter Input	SO239 connector
Balanced Output	Ceramic feed-through insulators
Power	12 VDC for meter lamp
OTHER	
Frequency Coverage	3.5-30 MHz
Power Maximum	300 W continuous
Dimensions	5.8"H x 12.8"W x 15"D
Weight	9.0 lbs.

3. CONTROL

FRONT PANEL



1. TRANSMITTER
   Eighteen-position rotary switch varies the inductance of the input inductor.
2. POWER/SWR METER
   Dual-needle meter displays FORWARD and REFLECTED power in watts. SWR is measured where the two needles intersect on the red scale.
3. ANTENNA
   Eighteen-position rotary switch varies the inductance of the output inductor.
4. ANTENNA SELECTOR
   Six-position rotary switch selects an output coaxial connector.

   1 TUNED selects ANTENNA 1 connector through the impedance matching circuit.

   2 TUNED selects ANTENNA 2 connector through the impedance matching circuit.

   1 DIRECT selects ANTENNA 1 connector bypassing the impedance matching circuit but providing SWR, FORWARD and REFLECTED power meter readings.

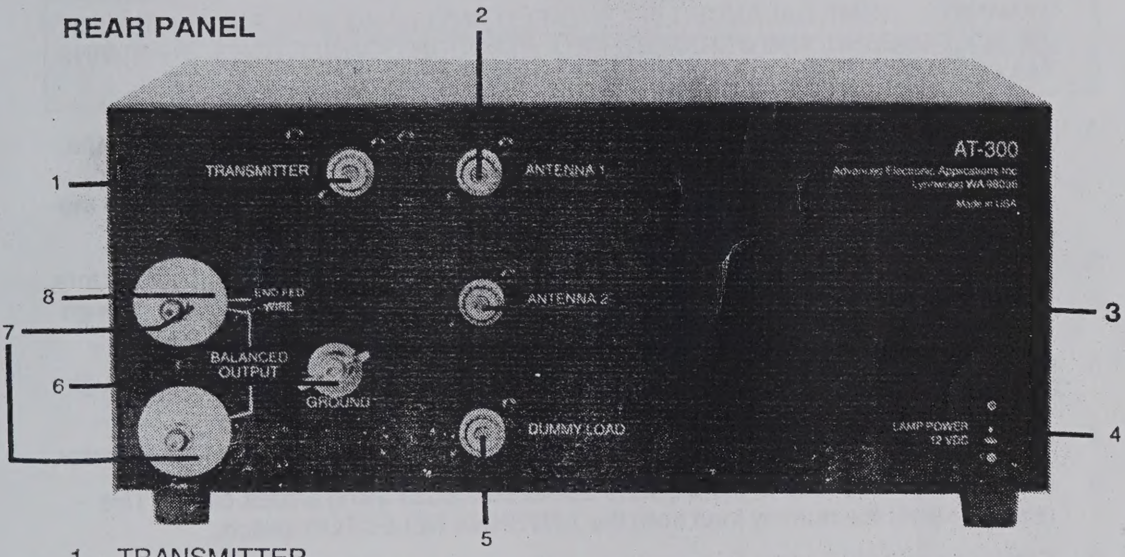
   2 DIRECT selects ANTENNA 2 connector bypassing the impedance matching circuit but providing SWR, FORWARD and REFLECTED power meter readings.

   DUMMY LOAD selects DUMMY LOAD connector bypassing the impedance matching circuit but providing SWR, FORWARD and REFLECTED power meter readings.

   BALANCED ANTENNA selects BALANCED OUTPUT connectors or END FED WIRE connector through the impedance matching circuit.
5. REACTANCE
   Continuously variable rotary control to vary the capacity of the tuning capacitor. Ten-position settings are for reference only.
6. LAMP SWITCH
   Two-position rocker switch to turn meter lamp ON or OFF.

7. POWER RANGE
   Two-position rocker switch selects the range of FORWARD and REFLECTED power displayed on the power meter. HIGH selects FORWARD range of 300 watts full scale and REFLECTED range of 60 watts full scale. LOW selects FORWARD range of 30 watts full scale and REFLECTED range of six watts full scale.

REAR PANEL



1. TRANSMITTER
   Coaxial connector for input from transmitter or linear amplifier.
2. ANTENNA 1
   Coaxial connector for output to antenna one.
3. ANTENNA 2
   Coaxial connector for output to antenna two.
4. LAMP POWER 12 VDC
   Connector (2.1mm) for +12 VDC to power meter lamp.

> CAUTION: USE +12 VDC FOR THE METER LAMP. USE A SEPARATE SOURCE FROM THAT USED FOR OTHER EQUIPMENT, SUCH AS THE PK-232, PK-88, ETC.

5. DUMMY LOAD
   Coaxial connector for output to dummy load.
6. GROUND
   Post/wing-nut type ground connector.
7. BALANCED OUTPUT
   Two ceramic feed-through post connectors for output to RF balanced twin-lead antennas.
8. END FED WIRE
   Top terminal of BALANCED OUTPUT pair for output to a single-wire antenna.

4. INSTALLATION

Unpacking

Carefully unpack your AT-300 from the packing carton and inspect it for signs of damage. If any damage is apparent, notify the transportation carrier or dealer immediately. We recommend keeping the packing carton for moving, storing or reshipping the tuner.

Location Selection

Select a location for the AT-300 that allows the BALANCED OUTPUT connectors to be free from any possible contact during operation.

> WARNING: SOME BALANCED OR END-FED ANTENNAS WILL PRODUCE HIGH RF VOLTAGES AT THE CERAMIC FEED-THROUGH CONNECTORS. RF BURNS MAY RESULT IF TOUCHED DURING TRANSMISSION.

Installation Procedures

1. Connect a coax cable from your transmitter to the TRANSMITTER connector on the rear panel. Keep the cable as short as possible. If you use a linear amplifier, connect your transmitter to the linear amplifier input and the linear amplifier output to the AT-300.
2. Connect coax cable(s) from your antenna to ANTENNA 1 or ANTENNA 2 connectors on the rear panel. These connectors are either direct from the transmitter or through the tuned circuit depending on the setting of the ANTENNA SELECTOR switch.
3. Connect a balanced line antenna to the BALANCED OUTPUT ceramic feed-through connectors.
4. Connect a single-line antenna to END FED WIRE (top BALANCED OUTPUT) connector.
5. Connect a dummy load to the DUMMY LOAD connector using a coax cable. This lets you select the dummy load from the ANTENNA SELECTOR switch.
6. Connect a +12 VDC cable from your transmitter to the LAMP POWER 12 VDC connector. This provides lamp power for the meter.

> CAUTION: USE +12 VDC FOR THE METER LAMP. USE A SEPARATE SOURCE FROM THAT USED FOR OTHER EQUIPMENT SUCH AS THE PK-232, PK-88, ETC.

Before Operating

1. To avoid possible damage to the AT-300 Antenna Tuner, set TRANSMITTER, ANTENNA and POWER RANGE switches as outlined in the next section before applying transmitter power.
2. Begin tuning with your transmitter set at a low output power setting (10 to 20 W).
3. **Do not operate the AT-300 with the cover off.**

> WARNING: DO NOT CHANGE TRANSMITTER, ANTENNA OR ANTENNA SELECTOR SWITCHES WITH MORE THAN 30 WATTS OF APPLIED POWER.

6. NOTES

1. An SWR of 1:1 is best, but an SWR as high as 2:1 may be acceptable.
2. Check your transmitter manual for details.
3. If you cannot get an acceptable SWR, lengthen or shorten your antenna and/or feedlines and retune.
4. If you get low SWR readings at more than one setting, use the setting that gives:

   The highest FORWARD power reading.

   The lowest REFLECTED power reading.

   Uses the least inductance (lowest number) on the TRANSMITTER and ANTENNA switches.

5. TUNING

1. Select the band and frequency of desired operation.
2. Set TRANSMITTER, ANTENNA and REACTANCE controls to the suggested settings before applying transmitter power.

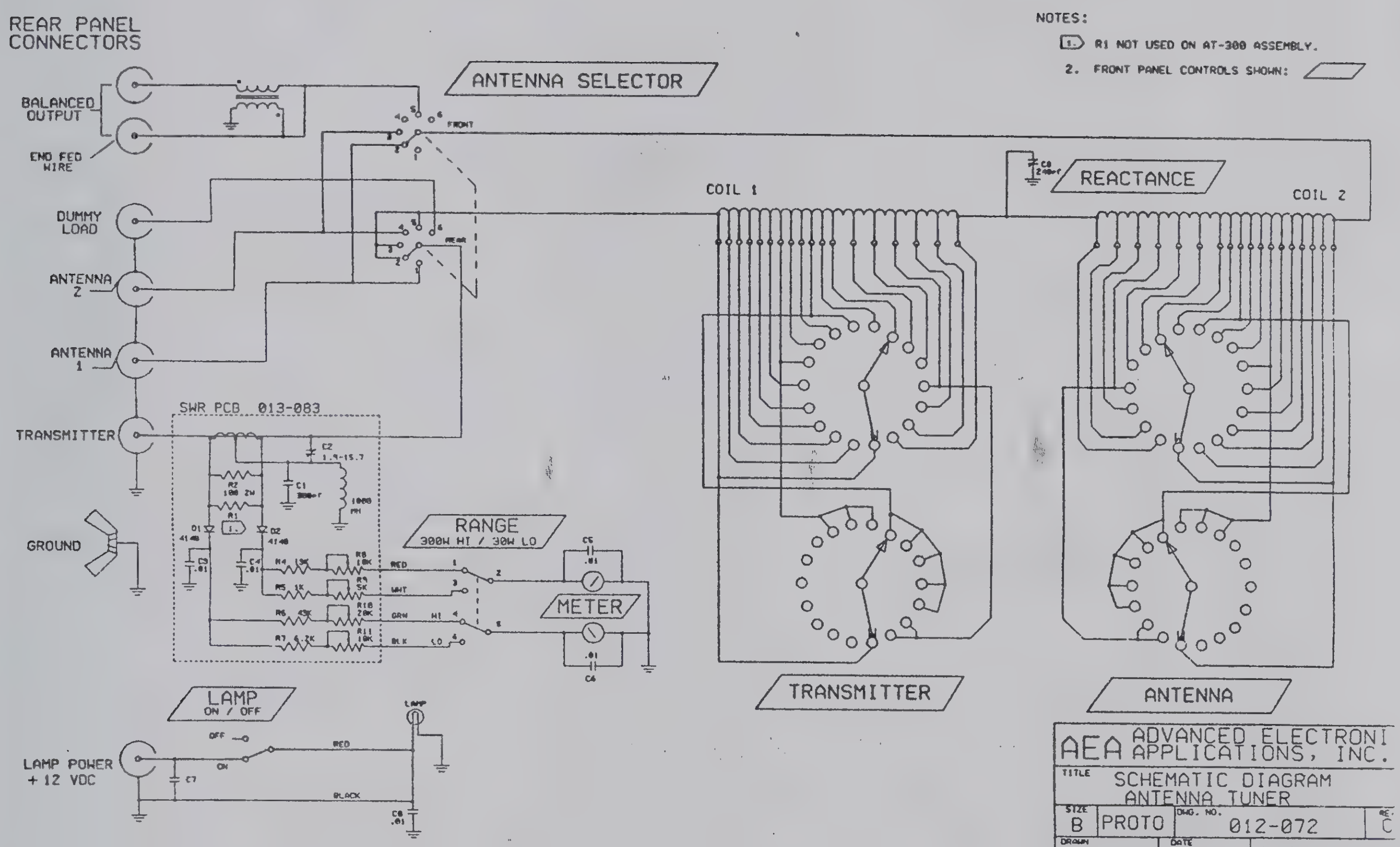
BAND/FREQUENCY	TRANSMITTER		ANTENNA		REACTANCE	
	Sug.	Actual	Sug.	Actual	Sug.	Actual
75M/3.75 MHz	16		17		8	
40M/7.15 MHz	12		13		4	
30M/10.125 MHz	12		13		3	
20M/14.175 MHz	9		10		3	
17M/18.118 MHz	7		7		1	
15M/21.225 MHz	6		6		3	
12M/24.940 MHz	5		5		3	
10M/28.850 MHz	2		3		4	

3. Set your transmitter to a low power output. If your transmitter has a TUNE position, select that position.
4. If you use a linear amplifier, set it to Standby. Do not use the linear amplifier until the AT-300 is tuned.
5. Set POWER RANGE switch to 30 W LOW.
6. Set ANTENNA SELECTOR switch to DUMMY LOAD or the position matching your antenna connection. To tune your antenna, the switch selection must be set to: 1 TUNED, 2 TUNED or BALANCED ANTENNA. Selecting 1 DIRECT and 2 DIRECT bypasses the tuning section.
7. Transmit using low power, but enough power to allow tuning.
8. Adjust the TRANSMITTER and ANTENNA switches left and right for maximum FORWARD power reading and watching for dips in REFLECTED power readings.
9. Adjust the REACTANCE control, also tuning for maximum FORWARD power and minimum in REFLECTED power.
10. Read the SWR on the red scale at the point where the two needles intersect. Repeat steps eight and nine until the lowest SWR reading is obtained. The SWR should be 2:1 or lower.

NOTE: THIS PROCEDURE TAKES PATIENCE THE FIRST TIME. THE TRANSMITTER AND ANTENNA SWITCHES CONTROL THE INDUCTORS AND PROVIDE COARSE ADJUSTMENTS. THE REACTANCE CONTROL PROVIDES BOTH COARSE AND FINE ADJUSTMENTS AND WILL PROVIDE THE FINAL FINE-TUNING ADJUSTMENT.

11. When you have tuned your antenna to the best SWR, record the settings of the TRANSMITTER, ANTENNA and REACTANCE settings on the chart above for future reference. When you retune, use these settings as your starting point.

7. SCHEMATIC DIAGRAM



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Advanced Electronic Applications, Inc.

INSTRUCTION MANUAL

AEA BASIC MORSE TRAINER

Model BT-1 & BT-1P

P.O. Box C2160 • Bldg O & P—2006-196th SW • Lynnwood, Wa. 98036-0918
(206) 775-7373 Telex: 152571 AEA INTL

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INSTRUCTION MANUAL

AEA BASIC TRAINER

Model BT-1 & BT-1P

Congratulations on your decision to purchase the new AEA Basic Trainer Model BT-1 or BT-1P. You will find it a great aid in teaching or learning the Morse code.

To gain the most satisfaction and enjoyment from your unit, we recommend you first read this Manual carefully and then keep it close at hand for quick reference during the operation of your unit.

The AEA Basic Trainer can help a student achieve good copying proficiency in the shortest possible time. By establishing two 20 to 30 minute study periods each day, the average student can develop an ability to copy the Morse code at approximately 20 WPM after four weeks of study. It is very important to maintain a well disciplined schedule with good concentration. The rewards for good discipline are "dah didadit dit dadah dit dadit dadidit dadadah dididah dididit"!

BEST OF LUCK!

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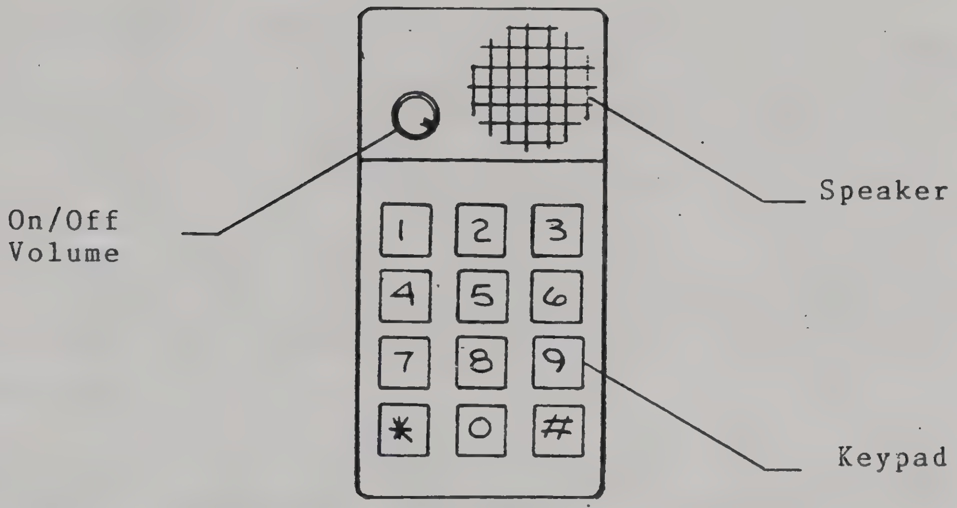
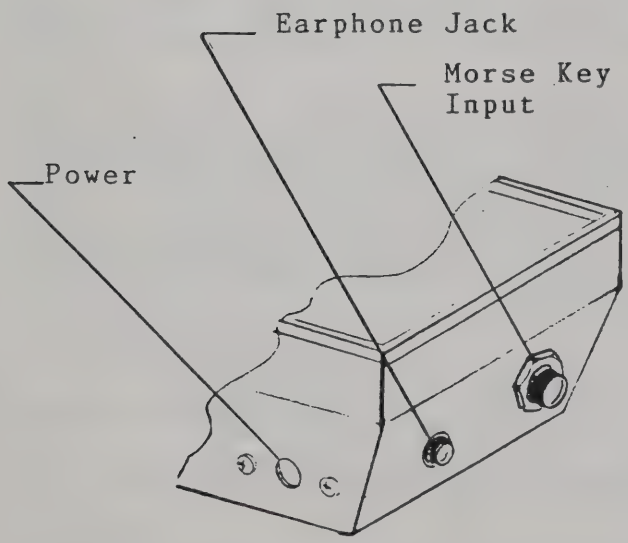
TOP PANEL DESCRIPTION

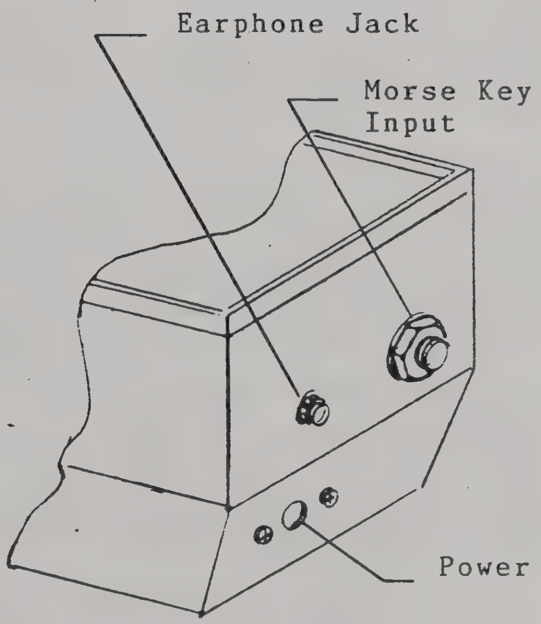


BT-1 AND BT-1P

REAR PANEL DESCRIPTION



BT-1



BT-1P

HOOK-UP INSTRUCTIONS

1. POWER

BT-1 . To perform the Check-Out Procedures in the following section and familiarize yourself with the BT-1, it is first necessary to apply 13 volts ± 3 volts to the power input jack on the rear panel of the BT-1. (For the BT-1P, see next paragraph.) This may most easily be accomplished by connecting the output cord attached to the optional AEA model AC-1 or AC-2 wall adaptor power supply to the power socket on the rear panel of the BT-1. If you are using another 12 VDC power supply or lantern battery be sure to connect the center lead of a mating power plug to + 12 volts, and the outer conductor to common. The external power source must be reasonably well filtered and capable of supplying at least 200 mA. The BT-1 may be used in an automobile with the optional AEA model DC-1 cigarette lighter power cord.

BT-1P. It is very important to take proper care of your expensive NICAD battery pack which is part of your BT-1P. The unit should arrive in a discharged condition. IMPORTANT: USE ONLY THE CHARGER THAT COMES WITH THE BT-1P TO CHARGE THE BT-1P. A constant voltage supply WILL DO DAMAGE to your NICAD batteries and they WILL NOT BE COVERED UNDER WARRANTY. Upon initial receipt of your BT-1P, plug the wall charger into a 117 VAC outlet and the output cord into the BT-1P power input connector. With the BT-1P power switch in the OFF position, allow the batteries to charge a few minutes. Now turn the unit on and press any button (with the volume nearly fully advanced clockwise), and note that you get some tones. Now, turn the power switch off and allow the BT-1P to charge uninterrupted for 14 hours. (The BT-1P is supposed to be charged with the power switch OFF but with the wall charger plugged in.)

For longest battery life, it is IMPORTANT that you exercise your batteries. After you have fully charged the batteries, use the BT-1P without ever connecting the wall charger again until you have fully discharged the batteries. Then you should give a full 14 hours charge before starting to use the BT-1P again. Then begin the discharge cycle all over again.

2. HAND KEY. The BT-1 and BT-1P can also double as a code sending practice oscillator. All you need to do is plug a standard 1/4 inch phone plug connected across a telegraph key into the key input jack on the rear panel. It is not important which side of the key goes to which terminal of the 1/4 inch phone plug.

To activate the code practice oscillator tone, simply press * 5 on the top panel keypad.

3. EARPHONE. The BT-1 and BT-1P also provide a rear panel jack for earphone monitoring. Upon insertion of the earphone plug into the jack, the internal speaker is automatically defeated for private listening.

CHECK-OUT PROCEDURE

We recommend that you perform the following procedures to quickly acquaint yourself with the BT-1 or BT-1P and to ensure that the unit is operating properly.

GENERAL FUNCTIONS.

1. Apply power to the BT-1. In the case of the BT-1P, be sure the batteries are charged. SEE HOOK-UP INSTRUCTIONS above.

2. Turn the power siwtch ON and advance the volume control about 2/3 fully clockwise.

3. On the keypad, press * and then hold 1 . The monitor tone should step up in frequency. It will remain at the last tone you hear when you release the 1 key.

4. Now press * and hold 2 . The monitor tone should step down in frequency. The monitor tone will now remain at the last tone you hear when you release the 2 button.

CODE SENDING PRACTICE.

1. Press * 5 and note that you now have a solid monitor tone emanating from the speaker. (Pressing # will halt the tone.)

2. Insert an earphone or headphone plug into the rear panel earphone socket and note that the monitor tone is now heard in the earphone and not in the speaker (for private listening).

3. If you have a telegraph hand key, plug a 1/4 inch phone plug (attached to the key) into the key input socket on the rear panel of the BT-1 or BT-1P. You will now note that the monitor tone will disappear until you press the telegraph key to form Morse code characters.

TRAINER FUNCTIONS

1. Press # to clear any previous instruction to the trainer.

2. Press 0 1 # 1 and note that the unit starts sending dididadit (Morse character F), a 3 second space, dididadit, etc.

3. Press # to halt.

4. Press * 6 5 0 . You have just entered a character speed of 50 WPM. Now repeat 0 1 # 1 and note that you still hear dididadit, but at a much higher rate of speed (50 WPM instead of 20 WPM). Press # to halt the trainer.

5. Press * 7 0 3 and then 0 1 # 1 . You will now hear dididadit, only a 0.3 second space, dididadit, etc. (The * 7 0 3 command shortened the normal 3 second space between characters to 0.3 seconds.) Press # to halt the trainer.

6. Press * 7 6 0 and then 0 1 # 1 and note that you now have a 6 second space between characters. Press # to halt. Turn the power switch off and back on and press 0 1 # 1 and note that the spacing between characters has returned to 3 seconds.

7. Press 0 1 # 2 and note that you now hear dididadit, dididadit, space, dididadit, dididadit, space, etc. The short space between the first 2 characters is called a character space, the long space is a long word space.

8. Press 0 1 # 5 and note that 5 characters are now sent between word spaces. Press # to halt.

9. The next step will require a little more knowledge of the Morse code to verify. The odds are that if everything has been working properly so far, this step is not really necessary. You may want to come back to it after you have learned some of the characters.

Press 0 4 # 4 and note that the letter "Q" appears approximately 50% (percent) of the time in relation to F, K, and B that are also being sent.

Now press 0 4 * 4 and note that the letter "Q" does not appear any more or less frequently (on the average) than the other characters, F, K, or B. Press # to halt.

This completes the check-out procedure for your BT-1 or BT-1P. If all steps have been verified as working properly, you are now ready to begin your Morse code training.

ABOUT OUR TEACHING METHOD

The AEA Basic Trainer Models BT-1 and BT-1P are computerized Morse code instructors. Character speeds are given at 20 WPM, with a three second interval between letters or letter groups. This ideal method of learning characters at a higher speed to begin with, eliminates the learning plateau so many Morse code students encounter at 10-12 WPM. Educational Technology and Services, Inc., of St. Louis, Missouri has pioneered this teaching methodology in cooperation with research at a prominent mid-western university. The ETS system does not encourage the student to learn dot dot dash dot for F, but rather one cohesive sound of dididahdit (at the character speed of 20 WPM). As a result, a student does not have to unlearn bad habits such as counting dots and dashes in order to copy the code. When you begin learning the code at a 20 WPM character speed, the sound of any given letter will not change from 0-20 WPM, thereby making it so much easier for the student to increase his (her) copying speed. To facilitate this learning technique, the minimum programmable speed on the Basic Trainer is an 18 WPM character speed.

Each character is taught separately by repetition. The student progresses only after he is confident he knows the letters being presented by the BT-1.

After the first letter (F, in this case) is learned, a student may progress to the letter K. Upon learning K, the student activates the computer to present the letters F and K in random sequence at a 20 WPM character speed. This technique continues as the student learns each subsequent letter in the alphabet.

The sequence of characters has been selected to minimize confusion with previous characters. For this reason you will find the alphabet presentation quite different from typical code training programs. When a new character is practiced along with all previous characters learned, the new character appears fifty percent of the time (50% weighting).

RECOMMENDED LEARNING PROCEDURE

If at all possible, devote at least two 20-30 minute sessions a day to studying with your BT-1 or BT-1P. Each time you miss a day, you will find you have suffered a noticeable setback in your learning of the (Continental) Morse code. Avoid all interruptions or outside interference so you can be assured of maximum concentration.

There are generally two ways of copying Morse code. Some students use a typewriter (mill) for copy while others use a pencil and paper for writing down the copy. The obvious advantage of a typewriter is that it allows the student to ultimately reach higher speeds because most people simply cannot write faster than 25 WPM.

When copying with a pencil and paper avoid printing as you will find that it limits your copying speed.

Write down everything you hear as you practice. Be sure to put spaces in their proper places so that it becomes a good copying habit for later copy of plain text code. For example, when starting with 0 1 # 1 your copy should be written down like this: f f f f f . . . . . When you select 0 1 # 2 it should look like this: ff ff ff ff ff . . . . . With 0 1 # 3 it should read: fff fff fff fff . . . . . etc.

The BT-1 and BT-1P are programmed to present the code characters in a logical straight-forward manner. It is IMPERATIVE that you follow the CHARACTER SEQUENCE CHART in the EXACT sequence presented, by following the Character Sequence Chart in the same order that you would read a book (from left to right across the page and then drop down to the left side of the next line, etc.).

Each new step you take will present a new challange, be sure to practice on the current step long enough that you feel very comfortable that you are copying correctly at that level before you proceed to the next step. The BT-1 and BT-1P are meant to be used as self-paced trainers. Do not be concerned with how others might be progressing. Each student is entirely different. Some may start out learning the first few characters quickly, but then bog down later because of insufficient practice along the way. Others may show great difficulty at first, but find that the new characters become easier and easier to learn.

We recommend that you try to spend each 20-30 minute practice session of learning and practicing one new character. You will first start by hearing the character all by itself (in groups of one) and practice writing it down until you feel totally comfortable with it. Also, you should repeat the sound of the character in your mind with dits and dahs when you are first introduced to the new character in groups of one. As an example, K should sound like dadidah and F should sound like dididadit. Then proceed to groups of two where the new character is mixed 50 percent of the time with all the previous characters you learned in a similar manner. Then progress through groups of three, four and finally groups of five. Be sure that you are essentially copying solid in groups of five before you progress to the next character. Typically a student will learn a new character each 20 minute practice session. When returning to the next practice session, start by replaying the previous practice session in groups of 5 with solid copy before you proceed to the new character.

Remember "Arbeit macht den Meister" or practice makes perfect. If you progress to a level where you are having difficulty with a previously learned character, by all means go back to that particular session number (where the character was introduced) and practice until you have it perfected.

START LEARNING

Be sure to write down exactly what you hear as you practice. BE SURE to put the spaces in their proper place so that it becomes a good habit. Start your training in the following manner.

1. Start with 0 1 # 1 . Your copy should look like F F F F . . . . .

2. After you are comfortable with writing the letter F each time you hear dididahdit, select 0 1 # 2 and write it down so that it looks like FF FF FF FF . . . . .

3. Similarly, select 0 1 # 3. Your copy should resemble FFF FFF FFF FFF . . . . .

4. After proceeding through 0 1 # 4 and 0 1 # 5 in a similar manner, you are ready for the next character.

SESSION TWO

. Press 0 1 # 5 and confirm that you can copy solid. Press # to halt.

2. Press 0 2 # 1 and write K K K K . . . . . .

3. After you are familiar with writing K each time you hear dadidah, proceed to 0 2 # 2 . Your copy should now resemble FK FK KF FF KK . . . . .

4. Later progressing through groups of three, four and five you are ready for a break before starting the next character to be learned in a like manner.

Note that you should be sure to follow the exact sequence of character presentation outlined above or you will otherwise be presented with characters not yet learned or practiced. You will also note that each new character is weighted approximately 50% of the time against all the previous characters you have learned.

Continue this process through the character sequence shown on page 10. Be sure you follow the exact sequence shown. The first 26 characters are alphabetic, the 27th through the 36th characters are numerals. Following this, the 37th through the 46th characters are common punctuation and amateur radio ciphers. The 48th through the 61st characters are uncommon punctuation and Spanish/German alpha characters. For most students, the first 46 characters will fulfill all their needs in Morse code operation.

CHARACTER SEQUENCE CHART

Session Number	Character	Character Introduction	Groups of 2	Groups of 3	Groups of 4	Groups of 5
1.	F	01#1	01#2	01#3	01#4	01#5
2.	K	02#1	02#2	02#3	02#4	02#5
3.	B	03#1	03#2	03#3	03#4	03#5
4.	Q	04#1	04#2	04#3	04#4	04#5
5.	T	05#1	05#2	05#3	05#4	05#5
6.	C	06#1	06#2	06#3	06#4	06#5
7.	Z	07#1	07#2	07#3	07#4	07#5
8.	H	08#1	08#2	08#3	08#4	08#5
9.	W	09#1	09#2	09#3	09#4	09#5
10.	X	10#1	10#2	10#3	10#4	10#5
11.	M	11#1	11#2	11#3	11#4	11#5
12.	D	12#1	12#2	12#3	12#4	12#5
13.	Y	13#1	13#2	13#3	13#4	13#5
14.	U	14#1	14#2	14#3	14#4	14#5
15.	P	15#1	15#2	15#3	15#4	15#5
16.	A	16#1	16#2	16#3	16#4	16#5
17.	J	17#1	17#2	17#3	17#4	17#5
18.	O	18#1	18#2	18#3	18#4	18#5
19.	E	19#1	19#2	19#3	19#4	19#5
20.	R	20#1	20#2	20#3	20#4	20#5
21.	S	21#1	21#2	21#3	21#4	21#5
22.	G	22#1	22#2	22#3	22#4	22#5
23.	N	23#1	23#2	23#3	23#4	23#5
24.	L	24#1	24#2	24#3	24#4	24#5
25.	V	25#1	25#2	25#3	25#4	25#5
26.	I	26#1	26#2	26#3	26#4	26#5

This completes the alphabet. Be sure you can copy these accurately and without hesitation before proceeding on to the numerals.

27.	3	27#1	27#2	27#3	27#4	27#5
28.	1	28#1	28#2	28#3	28#4	28#5
29.	6	29#1	29#2	29#3	29#4	29#5
30.	9	30#1	30#2	30#3	30#4	30#5
31.	5	31#1	31#2	31#3	31#4	31#5
32.	2	32#1	32#2	32#3	32#4	32#5
33.	0	33#1	33#2	33#3	33#4	33#5
34.	8	34#1	34#2	34#3	34#5	34#5
35.	4	35#1	35#2	35#3	35#4	35#5
36.	7	36#1	36#2	36#3	36#4	36#5
37.	. Period	37#1	37#2	37#3	37#4	37#5
38.	, Comma	38#1	38#2	38#3	38#4	38#5
39.	? Question	39#1	39#2	39#3	39#4	39#5
40.	/ Slash	40#1	40#2	40#3	40#4	40#5
41.	-- DoubleDash	41#1	41#2	41#3	41#4	41#5
42.	AS	42#1	42#3	42#3	42#4	42#5
43.	AR	43#1	43#2	43#3	43#4	43#5
44.	SK	44#1	44#2	44#3	44#4	44#5
45.	BK	45#1	45#2	45#3	45#4	45#5
46.	KN	46#1	46#2	46#3	46#4	46#5

The remainder of the characters are optional. Their usage in amateur radio is limited.

47. - Hyphen
48. ! Exclamation
49. Understood
50. ; Semi colon
51. : Colon
52. ( ) Parenthesis
53. ' Apostrophe
54. " Quotation
55. CH/Spanish
56. N Spanish
57. E
58. O German
59. u German
60. A Spanish
61. A

Much ham band Morse makes use of a "code shorthand". This is practiced by virtually all hams. For example, the following is typical of what you migh copy, "Hrd ur call es gave shout - ur sigs 579 hr". That brief copy really means, "I heard you calling so I answered you. Your signals are 5 readability, 7 strength and 9 tone here."

Morse code is like learning a foreign language. The more you use it the more proficient you become. If you learn the Morse code and then fail to use it, you will have to work at attaining your prior level of proficiency by practice and use.

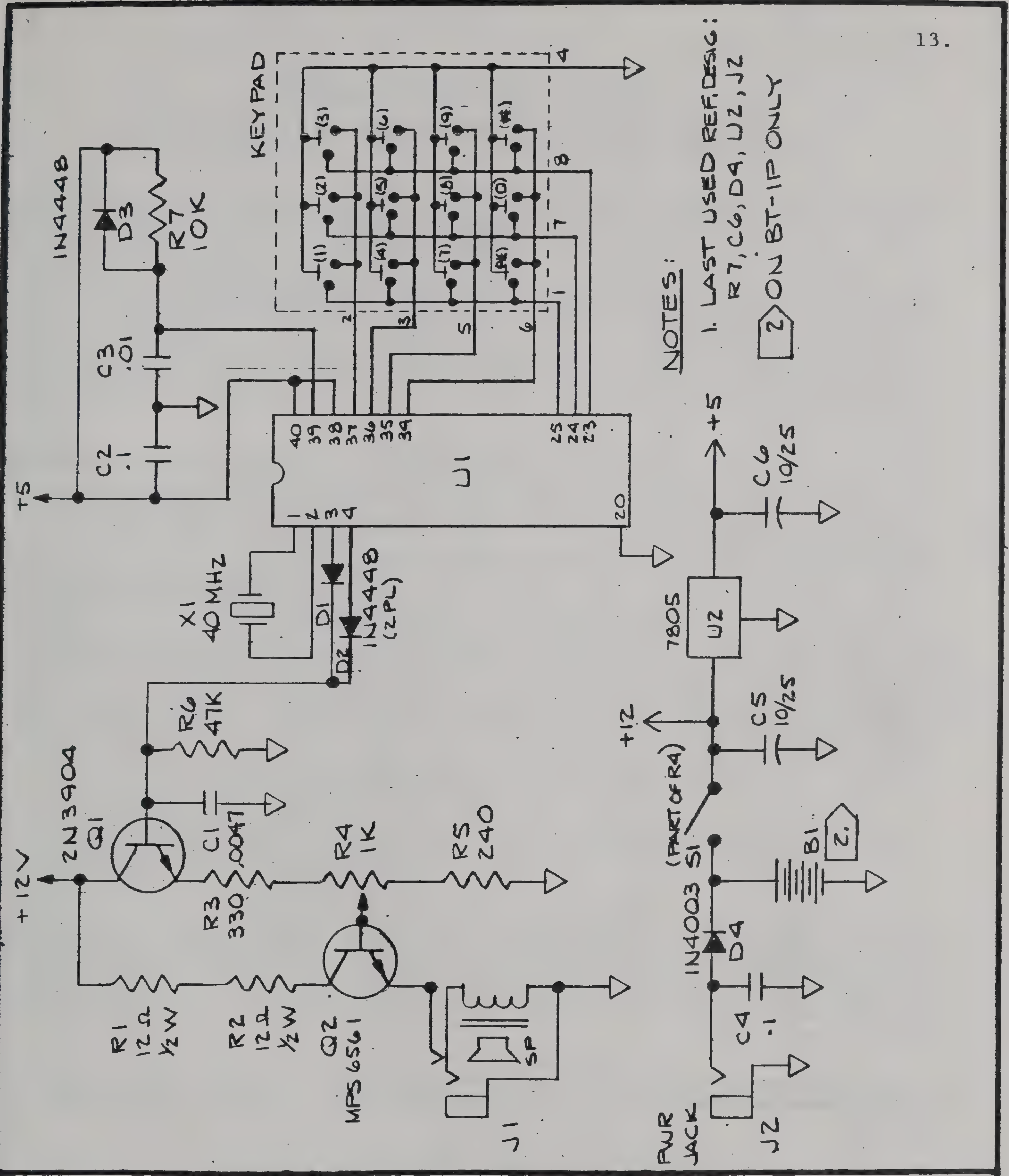
LEARNING TO SEND MORSE CODE

No mention has been made about learning to send Morse code. Sending is much easier to learn. Your sending should try to duplicate the way the characters are presented by the BT-1.

The recommended means of learning how to send in the past has always started with a hand key, however some people just cannot seem to operate a hand key proficiently no matter how hard they try. People who have gone directly to a Morse electronic keyer and paddle set have done so well, that previous opinions about starting with a hand key are in serious question.

Regardless of the type key or keyer used, it is very important that the student develop the proper sending rhythm so that his fist is easily read by other stations on the air. A good fist and operating practices can make more difference than an expensive transmitter and antenna system for establishing contacts under adverse conditions.

AEA is noted for manufacturing the world's most sophisticated line of self-contained computerized Morse code keyers that are simple to operate and low in cost. We also manufacture the MBA-RO code reader that is an excellent device for correcting and improving one's fist. Even skilled CW operators find they can improve their spacing of characters and words tremendously through the use of an MBA-RO which serves as an impartial judge in monitoring one's sending. More information on the MBA-RO and our keyers is available in the current AEA Product Catalog.



NOTES:

1. LAST USED REF. DESIG: R7, C6, D4, U2, J2
2. ON BT-1P ONLY

dwn HARTLEY	ADVANCED ELECTRONIC APPLICATIONS INC.
date 6-3-82	
dwg no 012-010	sht 1 of 1 · rev NEW
SCHEMATIC BT-1, BT-1P	

SUMMARY OF PROGRAMMING COMMANDS

COMMAND	PRESS	WHERE NN EQUALS
Tone Increase	* 1 (hold)	
Tone Decrease	* 2 (hold)	
Solid Tone (For sending practice)	* 5 (# halts)	
Character Speed Setting	* 6 N N	18 to 99 WPM. Programmed to start at 20 WPM.
Delay between letters or groups	* 7 N N	0.1 to 9.9 seconds (Programmed to start at 3.0 seconds.)
One Character Only	N N # 1	Character (trial) number
Random number of characters in groups	N N # 0	Character (trial) number.
Specific number of characters in groups	N N # N	N N = Character (trial) number N = 2 to 9 characters in groups (student should be competent with groups of five before adding new characters.
New characters are weighted 50% of the time against all previous characters learned (which are weighted equally).	N N # N	Same as above
Halt training session or mode	#	

Stu

AEA ISOPOLE 144
ASSEMBLY INSTRUCTION SHEET

The AEA IsoPole Antennas represent a breakthrough in vertical VHF base station antenna design. The IsoPoles offer superior decoupling and a predictable radiation pattern and the MAXIMUM GAIN POSSIBLE FOR THE LENGTH OF THE ANTENNA. The mechanical construction offers a rugged design at a very affordable price that will withstand the harshest weather.

Each IsoPole is factory tuned and only requires adjustment of the element lengths in the field.

The IsoPole antennas were designed to mount on low cost, standard 1¼ inch TV mast, available at most local hardware stores, TV shops, or electronic stores (including Radio Shack). Any mast with an inside diameter of at least 0.75 inches (to pass PL-259 connector) and no more than 1.275 inch outside diameter will be suitable. The maximum mast length is unlimited so far as the IsoPole is concerned, but should be no longer than good engineering practice dictates for the strength of the material used. (The 10 foot Rohn heavy duty galvanized steel mast is an excellent choice.) The minimum length of mast is approximately 8 feet for the IsoPole 144.

ISOPOLE 144 ASSEMBLY (USE GLOVES TO AVOID SHEET METAL CUTS)

1. Slide the lower cone (the one with a decal) over the top of the mast and position a distance of L-2 (see the frequency chart below) from the top of the mast. Slide a cone stabilizing disc over the bottom of the mast below the lower cone.
2. If the mast is painted, scrape the paint off from the area where the top of the cone makes contact with the mast. Apply silicon grease or Vaseline type petroleum jelly over the scraped area of the mast to prevent possible corrosion.
3. Place the cone in position and secure with one of the two large stainless steel hose clamps provided. Hold the open end of the cone in a symmetrical position around the mast as the clamp is tightened. Slide the cone stabilizing disc up inside the lower cone to lock in position.
4. Slide the remaining cone stabilizing disc over the top of the mast and down over the mast to a position just above the lower cone. Slide the upper cone over the top of the mast and secure in a similar manner a distance of L-1 from the top of the mast. Slide the cone stabilizing disc up inside the lower cone to lock position.
5. Pass the feedline (with a PL-259 coax connector attached) through the mast and attach to the recessed connector in the base of the upper element section. It is recommended that RG-8 or RG-8U be used if the length of the coax is more than about 20 feet.
6. Place the base sleeve of the upper element tube over the top of the mast and adjust the upper element length for a proper dimension L-3 for the center frequency of operation desired. Use silicon grease or petroleum jelly in the joint of the upper element section for additional weather sealing. Secure the joint with the small stainless steel hose clamp provided.

NOTE: The IsoPole is a broad band antenna and is easy to tune simply by following the dimensioning instructions above. However, if an SWR bridge is available and it is desired to tune the IsoPole exactly to a given frequency, it is possible (but not necessary) to do so. Simply extend L-3 (by extending the upper element and upper cone equally) to decrease the resonant frequency and decrease L-3 for increasing the resonant frequency. The lower cone should always move in unison with the upper cone (the distance between the upper and lower cones should not change).

WARNING: The antenna should be mounted so as to clear surrounding objects as much as possible, but a high location is most desirable. Be sure to mount the antenna so it will neither touch nor be able to fall into nearby power wiring.

ADVANCED ELECTRONIC APPLICATIONS, INC.
P.O. Box C2160
Lynnwood, Washington 98036 USA
(206) 775-7373

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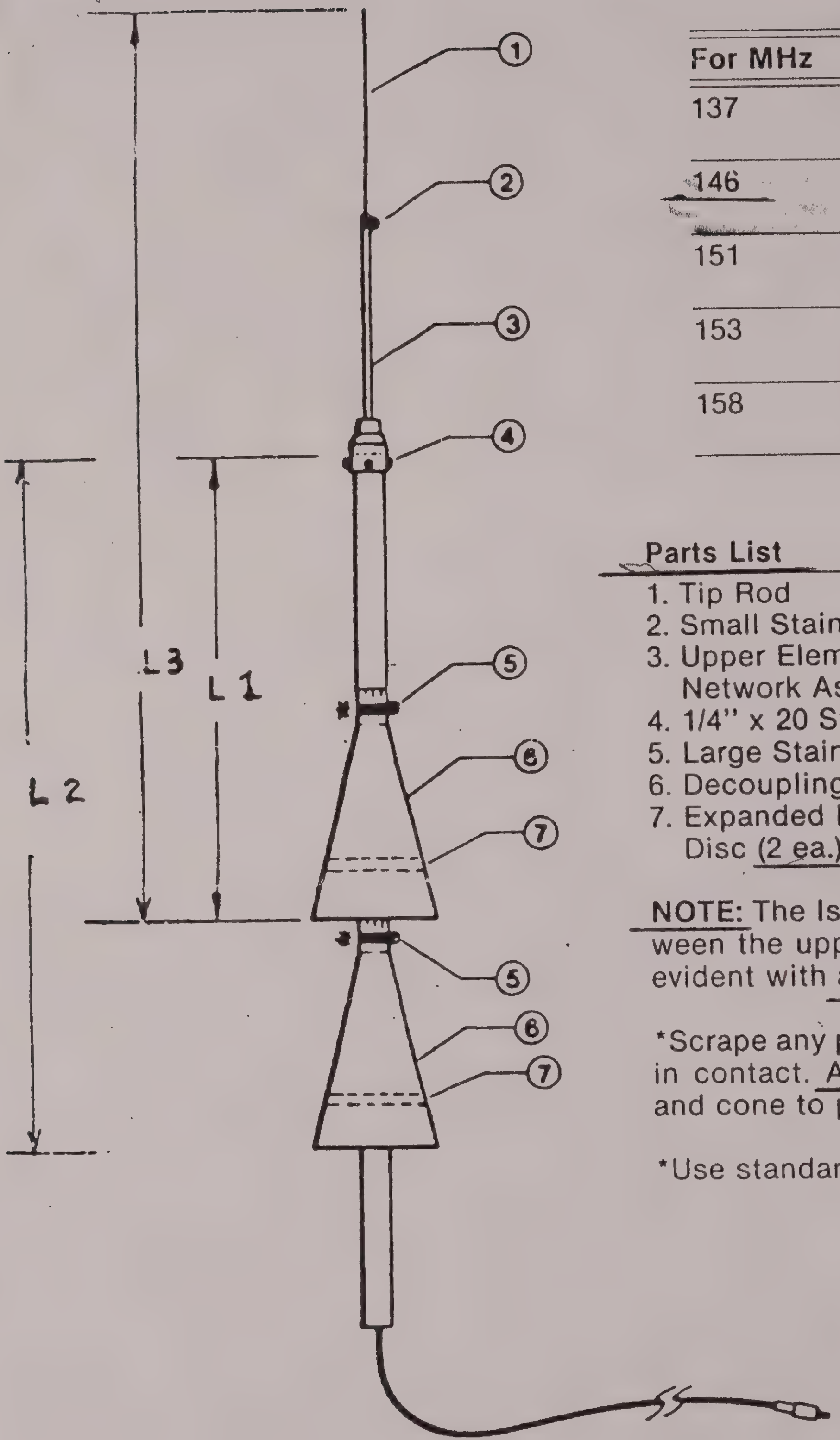

ISOPOLE 144

For MHz	L1	L2	L3
137	55" 1.40M	80.5" 2.04M	110" 2.79M
146	50" 1.27M	75.5" 1.92M	100" 2.54M
151	48" 1.22M	73.5" 1.87M	96" 2.44M
153	47" 1.19M	72.5" 1.84M	94" 2.39M
158	44" 1.12M	69.5" 1.77M	88" 2.24M

Parts List

1. Tip Rod
2. Small Stainless Steel Hose Clamp
3. Upper Element Tube and Matching Network Assembly
4. 1/4" x 20 Stainless Set Screws (3 ea.)
5. Large Stainless Steel Hose Clamp (2 ea.)
6. Decoupling Cone (2 ea.)
7. Expanded Polyethelyne Cone Stabilizing Disc (2 ea.)

NOTE: The IsoPole is D.C. grounded. A short between the upper element and the mast should be evident with an ohmmeter.

*Scrape any paint off the mast where cone comes in contact. Apply silicone grease between mast and cone to prevent possible corrosion.

*Use standard TV hardware to mount.

Equipment Needed: Mast, recommend use of low cost steel 1 ¼" TV mast available at most hardware, TV shops or electronic stores, e.g., Radio Shack at less cost than shipping a single piece. Mast must be a minimum of 8' long for 144 MHz (no maximum length). Minimum inside diameter is 0.75" and maximum outside diameter is 1.275".

Tools Needed: Accurate measuring stick or tape; Flat bladed screw driver; nut drivers, 1/4" and 5/16"; flat file (for removing paint from mast); silicone grease or petroleum jelly.

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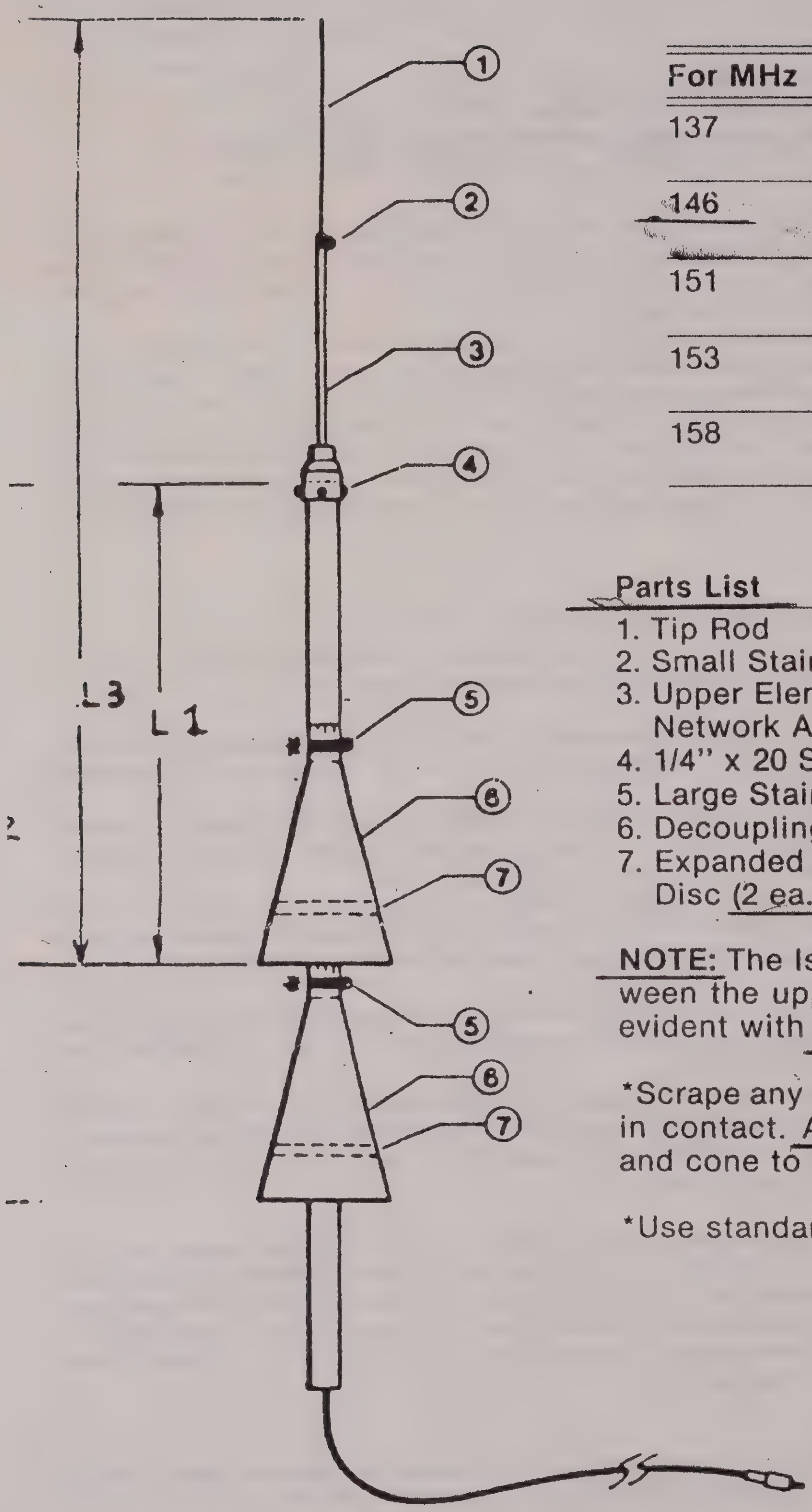

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Com Pakratt^{tm} Terminal Program for the PK-232 Data Controller

User's Guide

Advanced Electronic Applications
P.O. Box C-2160
Lynnwood, WA 98036
206-775-7373

AEASOFT (tm) SOFTWARE SUPPORT AGREEMENT/WARRANTY

AEA hopes to be better able to handle customer support requests by limiting assistance to those who have purchased the Com Pakratt (tm) program. Therefore, you must complete the warranty card and return it to AEA in order to initiate the 1 year support period for Com Pakratt. AEA may ask you for the Serial Number on the program cartridge if you call for assistance, and then call you back at the number(s) given on the warranty card.

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040-989 August 1987

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1.0 INTRODUCTION.

This hardware/software package for the Commodore 64 or 128 provides a sophisticated interface for the AEA PK-232 All-Mode Terminal Unit. Its features include:

- Split Screen with status lines
- Separate screen for each packet channel
- Windows for prompts
- Uses PK-232 Host Mode
- Function key operation of most common commands
- Preset memories including - CQ, Quick Brown Fox, RYRY, Over, Time, Callsign and SelCal
- Four programmable memories
- Dumb-terminal mode for setup, FAX and SIAM operation
- Full true-ASCII support on screen and keyboard
- QSO buffer can store over 23,000 characters
- QSO buffer review and scrolling
- Printer support for Commodore-compatible printers
- Text-file send and receive from disk
- Supports printing and downloading from buffer
- Disk management operations including:
  - Directory
  - View file
  - Convert files between Commodore/Viza/ASCII
  - Print file
  - Load/Save memories
  - Disk command entry
- Cartridge-based for immediate use

This program was written over a five-month period by Tony Mountifield, G4CJO.

1.1 SYSTEM REQUIREMENTS

Com Pakratt works with a Commodore 64 or 128 computer with a monochrome or color monitor, or a TV set as a display.
An AEA PK-232 with Firmware release date of January 1987 or later is also required. If you are interested in this program and still have October 1986 or earlier Firmware in your PK-232, please contact AEA for Firmware upgrade information.

2.0 INSTALLATION

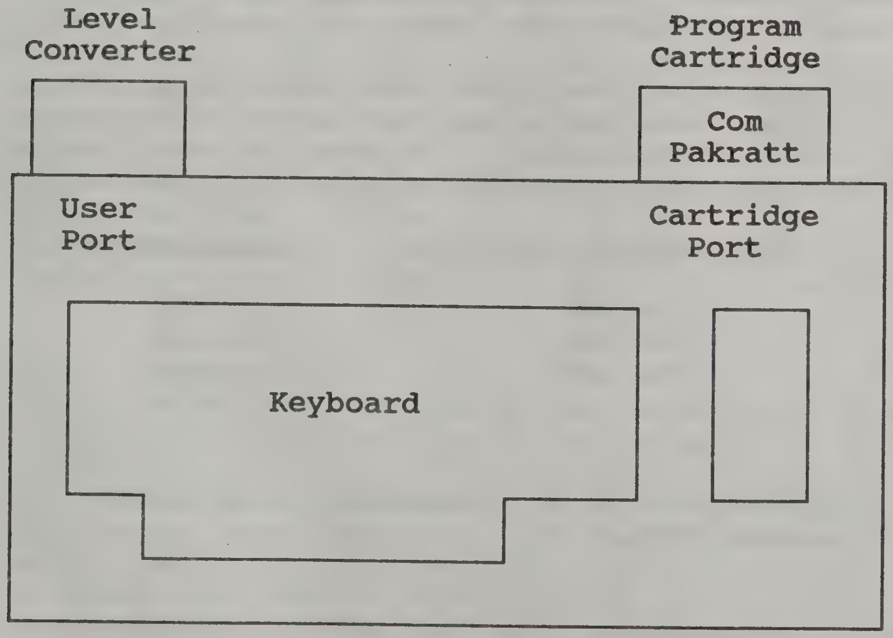
The Com Pakratt package contains the following items:

- Com Pakratt program cartridge
- Level Converter for use with the AEA PK-232
- This User's Guide with Keyboard Overlays

If you are setting up your PK-232 for the first time, you will need to refer to both this manual and the PK-232 manual from time to time. It is best to start with this manual and then refer to the PK-232 manual for connecting the PK-232 to your transceiver. This manual tells you how to use the Com Pakratt program to work the various modes of the PK-232. The PK-232 manual is a good reference for detailed information about specific operating modes and commands.

Carefully cut out the keyboard overlays in the back of this manual, or have them copied onto Card Stock. Place them over the appropriate keys on the Commodore 64. If you cut them out, it is a good idea to protect them with clear self-adhesive plastic.

MAKE SURE THAT THE COMPUTER AND ALL ITS PERIPHERALS ARE SWITCHED OFF. Insert the cartridge and Level Converter as follows:



The Program Cartridge goes into the Cartridge Port on the right rear of the computer, and the Level Converter goes into the User Port on the left rear of the computer. You may connect a disk drive and printer as described in the Commodore manuals. A cassette may be left connected if more convenient, although this program does not support cassette operations and will ignore it.

The supplied Level Converter is not a true RS-232 interface and so it may not work with other modems requiring RS-232 compatibility.

The disk drive, printer and other peripherals may now be switched on, followed by the computer. If this is your initial set up, the PK-232 should not be connected or switched on yet.

For initial setting-up of the PK-232, press 'T' for terminal mode. The screen will clear and show a cursor in the upper-left corner.

Install the 3 AA type batteries inside your PK-232 as described in the PK-232 manual.

The PK232 can now be connected using the special "Y" Facsimile cable if you have facsimile, or a simple 4-wire serial cable can be constructed as described below.

Connecting the Facsimile Cable
When using the Facsimile cable, simply plug the 25 pin male connector into the RS-232 I/O connector of your PK-232, and plug the 25 pin female connector into the Level Converter board. The 36-pin connector may be plugged into a parallel graphics printer if Facsimile operation is desired.

2.1 BUILDING A 4-WIRE SERIAL CABLE

If you do not have the Facsimile cable with your PK-232, you must provide your own shielded serial interface cable. A minimum of 4 connections must be made, however you may use cables that connect all 25 pins such as those commercially available for the IBM-PC.

You will need the following connectors, hoods and cable if you wish to construct your own cable. These parts are available from Jameco, Radio Shack as well as other parts dealers. We have included Radio Shack and Jameco part numbers where possible to simplify ordering.

Qty.	Part name	Radio Shack part #	Jameco part #
1	DB25P	276-1547	DB25P
1	DB25S	276-1548	DB25S
2	Hoods	276-1536	DB-25H
10 Ft.	4 Conductor Shielded Cable		S-C4

You may also be able to purchase a 10 Ft. assembled cable from Jameco under their Part number S4M-10-F.

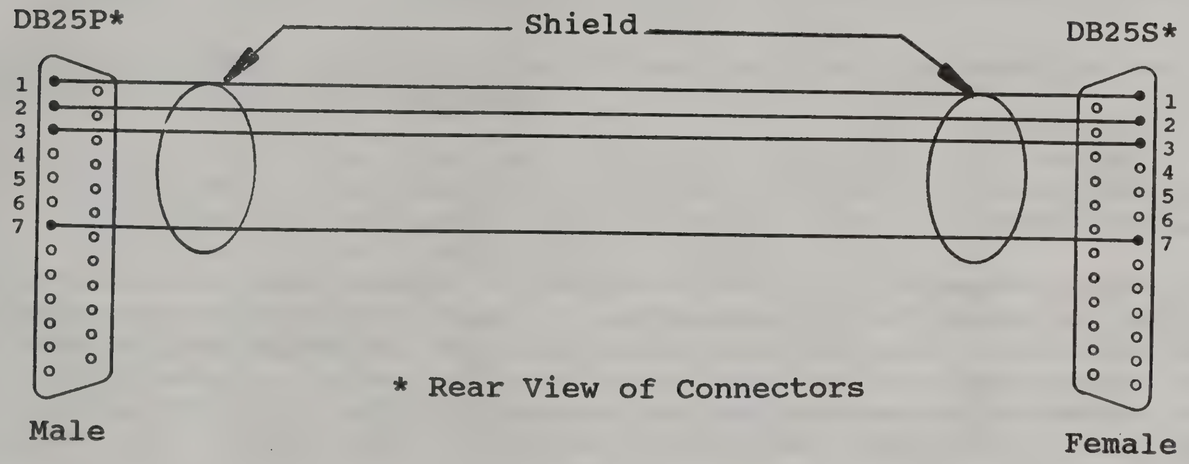
Only 4 connections need to be made to wire the cable correctly as diagrammed on the following page.

Pin 1 of the DB25P (male) connector should be connected to Pin 1 of the DB25S (female) connector using the shield of the cable. This is the Chassis Ground of the PK-232.

Pin 2 of the DB25P should be connected to pin 2 of the DB25S with one of the internal wires of the cable. This is the Transmit Data from the Commodore Computer to the PK-232.

Pin 3 of the DB25P should be connected to pin 3 of the DB25S with another internal wire of the cable. This is the Received Data from the PK-232 to the Commodore Computer.

Pin 7 of the DB25P should be connected to pin 7 of the DB25S with the third internal wire of the cable. This is the Signal Ground of the PK-232.



* Rear View of Connectors

CAUTION: The DB25P (male) and DB25S (female) are mirror images of each other. Make sure that you are wiring pin 1 to pin 1, and not pin 1 to pin 13 etc. The pin numbers should be embossed on the connectors themselves, and should be carefully noted.

After you have constructed the cable, install a hood on each end and then check the continuity of the cable if possible. This will insure there are no shorts or open connections in the RS-232 I/O cable before attaching it to your PK-232 and the Level Converter.

Turn on the PK-232

After you have connected 13 VDC power and the RS-232 I/O cable to the PK-232, you may turn the power switch on. The message "Please type a star (*) for auto-baud routine." should then appear on the screen. If you do not see this message, the PK-232 most likely has the battery backup installed, and has already been used with another computer or terminal. If the PK-232 has been set up at a speed other than 1200 baud with the batteries installed, Com Pakratt will not be able to communicate with the PK-232.

The safest course is to return the PK-232 to its "virgin" state by momentarily disconnecting the battery backup. Leave the batteries disconnected for a minute or two, and then re-install them in the PK-232 battery holder. You can also reset the PK-232 without removing the top cover by driving the PK-232 with the other terminal or program you have been using, and giving the command 'RESET'. At this time if you immediately turn the PK-232 off, it will be in its initial state.

2.2 SETTING PARAMETERS

When the PK-232 is turned on, and the screen has displayed the Autobaud message. Press the '*' key a few times until the main signon message appears. This is an excellent time to write down the date code and checksum of your PK-232 firmware. If you ever need to call AEA for service, we will almost certainly want to know what version of firmware is installed in your PK-232.

DATECODE 23 Feb 88 CHECKSUM $FC

It is now necessary to give the following commands before continuing:

```
DELETE ON
AWLEN 8
PARITY 0
RESTART
```

The signon message will then re-appear. Please take the time to set up the following PK-232 parameters (a short explanation accompanies each command). Some of the parameters are not mandatory, however Com Pakratt may not function exactly as the manual states if all of the following parameters are not entered. This will only need to be done once, providing the battery backup is installed in the PK-232.

ACRDISP 0

This prevents the PK-232 from inserting an extra CR periodically in received text.

ALFDISP OFF

This prevents the PK-232 from appending a LF to each CR - Line Feeds are not needed by this program.

ILFPACK ON

This causes incoming LF's in received text to be discarded.

CHSWITCH $5C

This sets the switch character for multi-connect in dumb-terminal mode to be '\' ('£' key).

AAB 'any desired text'

This sets up the Auto Answer-Back buffer, e.g. to your own callsign (see PK-232 manual). This is not required, but you may want to look up this command in the PK-232 manual for future reference.

CHCALL ON

This causes the callsign to be displayed when switching streams in the Dumb Terminal mode.

CONSTAMP ON

This causes the PK-232 to display the time of connections and disconnections if DAYTIME has been set.

DAYTIME 'current date and time'

The date and time must be entered in the following format YYMMDDHHmm where YY is the last two digits of the current year, MM is the current month, DD is the day of the month, and HHmm is the hours and minutes of the current time.

DAYSTAMP ON

This causes the PK-232 to display the date with the time.

EAS ON

This causes the PK-232 to echo AMTOR, BAUDOT, ASCII and MORSE data as it is sent.

MYCALL 'callsign'

This stores your own callsign in the PK-232. You can not Connect in Packet mode without entering your own callsign.

MYSELCAL 'SelCal'

This stores your own AMTOR SelCal in the PK-232 (see the PK-232 manual if unfamiliar with the construction of SelCals). You do not need to enter a SelCal if you are not planning to operate AMTOR, however you will not be able to enter any AMTOR modes until you have entered your SelCal.

MFILTER 8,17,19

This filters out XON and XOFF characters from the received data, as well as the BACKSPACE character.

Now that all the parameters have been entered, they should be held provided the battery backup has been installed. Even if power is lost, or the PK-232 is turned of, all parameters except for the date and time (set by the DAYTIME command) will be held.

2.3 SETTING THE COLORS

If you are using a color monitor or TV as a display, you may wish to change the screen colors. The text, background, highlight, and echo colors may be changed as follows:

CTRL f1 - Change background color.
CTRL f3 - Change text color.
CTRL f5 - Change highlight color.
CTRL f7 - Change echo color.

When changing colors, the selected color is shown by the border for a short time. The colors may be changed at any time in Dumb Terminal mode or from the Title Screen, but not from Split-Screen mode. The highlight and echo colors are not used in the Dumb Terminal mode, rather are used only in the Split-Screen mode.

If you have the entered all the parameters correctly, you are now ready to go on to the section of this manual describing the mode you are interested in. If you are interested in AMTOR, ASCII, Baudot, Morse or Packet, you may skip to the Split Screen mode, described in Section 4.

To enter the Split Screen mode simply hold down the Commodore (**C=**) key located in the bottom-left corner of the keyboard and type the letter H. Please note that in the rest of this manual, any reference to **C=** means the Commodore logo key described above.

If you are interested in Facsimile or SIAM operation, continue reading through the Dumb Terminal mode in section 3.

3.0 DUMB TERMINAL OPERATION

This mode is entered from the Title Screen with 'T', or from Split-Screen mode with 'C= T', and provides full ASCII Terminal operation at 1200 baud. Anything typed on the keyboard is sent to the User Port, and anything received on the User Port is displayed on the screen.

When one uses the Dumb Terminal mode of Com Pakratt the PK-232 is not operating in Host mode. The primary advantage of Com Pakratt is that the Host mode is used in the split screen portion of the program. For ASCII, AMTOR, Baudot, Morse and Packet operation, one should use the Split Screen portion of Com Pakratt described in the next section.

The SIAM and Facsimile mode do not lend themselves to split screen operation. These modes are accessed through the Dumb Terminal part of Com Pakratt and are described below.

3.1 FACSIMILE OPERATION

Detailed facsimile operation is described in the Facsimile Appendix of the PK-232 operating manual. The basic commands are given below, leaving the PK-232 Facsimile Appendix as a reference guide.

The default printer type is set for Epson compatible graphics printers. If you have a printer that uses a different graphics format, you must have at least the 25.JUN.87 PK-232 firmware and set the command PRTYPE for the graphics standard your printer supports.

To place the PK-232 into Facsimile, first type a CONTROL-C to get the PK-232 into Command mode and then enter the command FAX followed by a RETURN. The PK-232 should respond with:

```
OPMODE  was  XXXXX
OPMODE  now  FAX
```

You must also connect a parallel graphics printer to the PK-232 with the "Y" Facsimile cable, and then tell the PK-232 that a parallel printer is connected by entering the command PRCON ON. The front panel LEDs will no longer indicate status as long as PRCON is ON.

After tuning in a facsimile signal, you may either wait until the PK-232 synchronizes on the next picture, or type the command LOCK to force the printer to start printing the current picture.

The command JUSTIFY can be used to center the picture after a manual start using the LOCK command. JUSTIFY moves the picture to the left in half-inch increments.

When the picture is through printing, a Stop signal should be sent by the transmitting station. You may also force the PK-232 back to standby with the command RECEIVE, or by simply changing modes.

Remember to give the command PRCON OFF when you are through printing Facsimile pictures to re-enable the front panel LEDs.

3.2 SIAM OPERATION

SIAM operation is described thoroughly in the SIAM Appendix to the PK-232 Operating Manual. However, basic SIAM operation is described below leaving the SIAM Appendix as a reference guide.

SIAM stands for Signal Identification and Acquisition Mode and identifies and analyzes RTTY, ASCII and AMTOR signals to determine the signal type and the speed. This way the "guesswork" is taken out of identifying what kind of digital signal you are listening to.

To use SIAM simply enter the SIAM mode by typing the command SIGNAL. The PK-232 will then begin to analyze the signal that is tuned in. After 20 to 30 seconds the PK-232 will respond with the mode and analyzed speed of the signal. Simply type the command OK and the PK-232 will set the correct mode and speed commands for you if the signal is one it can copy. Otherwise the PK-232 will respond with "?bad" indicating that the signal is not printable.

If the PK-232 can copy the signal, you will see it begin to print. You may type **C=** H to enter the Split Screen mode at this time.

3.3 OTHER FEATURES OF THE DUMB TERMINAL

In both the Dumb Terminal and the Host modes, full word-wrap is provided to ensure that no words shorter than a screen line get split at the edge of the screen. A 'word' is anything with a space or RETURN on either side. If a non-space character is about to be written to the last column of the screen, the whole word is moved down to the next line on the screen.

Although the Commodore keyboard is fairly complete, there are a few non standard characters that it is often handy to be able to send. The following is a list of special characters and their ASCII codes that you may send in the Dumb Terminal mode:

£ - Send \ ($5C).
SHIFT @ - Send ` ($60).
SHIFT + - Send { ($7B).
SHIFT £ - Send | ($7C).
SHIFT - - Send } ($7D).
SHIFT ^ - Send ~ ($7E).

DEL - Send DELETE code ($7F).
C= SHIFT - CAPS LOCK for keyboard.
C= H - Enter Host (split-screen) mode.

There is no access to the disk or printer in the Dumb Terminal Mode. The primary purpose of Com Pakratt is to provide a full featured Split Screen interface for the PK-232, not another terminal program.

It is not a good idea to switch off, or disconnect the PK-232 while in the Dumb Terminal mode. It will be necessary to start again in Dumb Terminal Mode (using 'T'), if this happens.

To re-enter split-screen (Host) mode, press '**C=** H'.

4.0 SPLIT SCREEN OPERATION

This is the normal mode which will be used most of the time when operating the PK-232. The split-screen mode is entered from the Title Screen with RETURN, or from the Terminal Mode using 'C= H'. In this mode the Commodore communicates with the PK-232 using 'Host Mode', which is much more computer-friendly than the normal Verbose mode. Host Mode allows data and commands for each channel to be identified and directed to the appropriate buffer.

The screen is divided into two main scrolling regions. The upper, larger region is the Receive Buffer area, and the lower one is the Keyboard Buffer area. Above each area is a status line in reverse video with smaller characters. The lower status line always indicates the mode in use. When a YES/NO (ON/OFF) parameter is changed with a function key, the new value is displayed at the right-hand end of the lower status line. There is also one screen line above the top status line reserved for error and information messages.

In the Receive Buffer area, received text is shown in the 'normal' color, status messages (e.g. Connected or Disconnected) in the 'highlight' color, and transmitted text in the 'echo' color. These are normally light gray, yellow and cyan respectively, but may be changed as described in section 2.3.

In the Keyboard Buffer area, a RETURN (CR) character is shown as a small left arrowhead. This is to aid the putting in of a CR at least every 80 characters (two screen lines) when sending messages to WORLI-type mailboxes which unfortunately cannot just accept continuous text.

Ordinary, characters typed in will be entered into the keyboard buffer and displayed in the Keyboard Buffer area. Memories may likewise be invoked. To enter a control-character, precede it with CTRL-V. In packet mode, the text will actually be sent to the PK-232 when PACLEN characters have been entered, when a RETURN is typed, or when the channel is changed. In other modes, the text is sent to the PK-232 when a non-alphanumeric character is typed. This way it is still possible to make corrections within the word being typed.

Keyboard overlays for the C-64 are provided with this manual, to assist in using the Function Keys and the top row keys.

4.1 GENERAL OPERATION

This describes those operations which apply to most or all modes of communication. Most commands to the computer are given by holding down the 'C=' key and pressing a letter.

C= M - Mode Select

This key is used to select the mode of operation. A menu of options will be displayed in a window. Select the desired mode (Packet, Morse, ASCII, Baudot or Amtor) by pressing the appropriate digit key 1 to 5.

NOTE: All receive buffers are cleared when changing to or from Packet mode.

C= T - Terminal Mode

This key is used to enter Dumb Terminal mode (see section 3.0), usually for giving the PK-232 a lesser-used command for which no function key is provided, such as BTEXT, MFROM, MTO, etc. The Dumb Terminal mode is also used for Facsimile and SIAM operation.

NOTE: If the mode is changed to or from Packet while in the Dumb Terminal Mode, all receive buffers are cleared when re-entering Host Mode (split-screen).

C= Q - Quit

This key is used to put the PK-232 into a defined "hold" state, so that it will still store incoming messages while the computer is switched off or used for something else. This should be done whenever it is desired to turn off the Commodore computer, while leaving the PK-232 running.

NOTE: It is most important to disconnect the PK-232 from the computer before switching the computer off if the release date of firmware in the PK-232 is prior to 25.JUN.87. Switching off the computer with the PK-232 still connected will result in a BREAK signal on the RS-232 input of the PK-232. This will cause versions of PK-232 firmware with datecodes prior to 25.JUN.87 to leave host mode. The PK-232 will not then store any data received off the air, but will send it to the switched-off computer! Contact AEA if you are interested in a PK-232 firmware update to eliminate this inconvenience. Do not under any circumstances insert or remove the PK-232 Converter, or the Com Pakratt cartridge from the Computer while the computer is switched on. This can severely damage the cartridge or your Commodore computer.

Having typed 'C= Q', it is possible to return to normal operation by pressing any key, if it is not desired to quit after all.

C= S - Send File
This key is used to send the contents of an ASCII disk file to another station. A window will appear prompting for the file name. Enter the file name and press RETURN. The transmit buffer input will then be taken from the disk file instead of the keyboard, and can be seen in the Keyboard Buffer window. The file being sent may be aborted by pressing the RUN/STOP key. When sending has finished or been aborted, the message "SEND FILE TERMINATED" will appear at the top of the screen.

C= R - Receive File
This key is used to store data received off the air into an ASCII disk file. A window will appear prompting for the file name. Enter the file name and press RETURN. A message showing the file name is displayed at the top of the screen, and anything appearing in the Receive Buffer area will then also be saved to the disk file. To stop saving to disk and close the file, use 'C= O'.

NOTE: In packet, it is only possible to receive a file from ONE channel at a time, and the "RECEIVING" message only appears when that channel is displayed.

C= P - Printer On
This key is used to provide hard-copy of data received off the air on the printer. Text is converted from ASCII to Commodore codes before printing. A "PRINTER ON" message is displayed at the top of the screen, and anything appearing in the Receive Buffer area will be sent also to the printer. To stop printing completely, use command 'C= O'.

NOTE: In packet, it is only possible to print from ONE channel at a time, and the "PRINTER" message only appears when that channel is displayed. Also, it is not possible to receive a file and print simultaneously, even on different channels.

C= O - Printer/Disk Off
This key is used to close a disk or print file. The "RECEIVING" or "PRINTER" message will no longer be displayed.

C= L - Logging Suspend/Resume
This key is used to temporarily suspend receiving of a file or printing, without closing the file. The top line displays "RECEIVING OFF" or "PRINTING OFF". To resume, press 'C= L' again.

C= D - Disk Menu
This key is used to invoke the Disk Menu, which is described in section 5.0.

C= W - Write to Memory
This key is used to view or write to one of the four user-programmable text memories. The maximum length of each memory is 255 characters. A window is displayed with a prompt for the memory number. A digit 1 to 4 should be entered. Having selected a memory, its current contents are displayed, and the new contents may be entered. The entry is finished with RETURN, or aborted with the RUN/STOP key. To include a RETURN or a control-character in the memory, press CTRL-V first.

The contents of all four memories may be saved to disk together from the Disk Menu, and later loaded into the computer again (see section 5.0). It is not possible to save and load single memories individually.

C= B - Buffer Usage

This key is used to display the usage and size of all the QSO buffers, and the amount of free space. Free space is claimed in 256-byte chunks by each buffer as it fills. When the free space is exhausted, new data overwrites the oldest on a per-buffer basis. Press any key to return to normal operation.

C= E - Echo Tx On/Off

This key is used to enable or disable the recording of transmitted text in the receive buffer (and consequently to disk or printer). The default is echo enabled. In non-packet modes with Echo Tx Off, a separate window is provided for echoed transmit text, so that the rate of transmission may still be observed.

Cursor Right - "Over"

This key is used in Packet and Amtor to provide an "over-to-you" function. In Amtor it generates the "+?" required to pass transmission to the other station. In Packet it generates the conventional chevrons ">>>" followed by RETURN. Note that in Packet this should not be done at the end of every line or sentence, but is an indication that you have stopped typing and are now waiting for the other station to type a reply.

Cursor Up - Review Buffer

This key is used to enter Review Mode on the current channel. The current Receive Buffer may then be scrolled up and down using the cursor keys. HOME moves to the beginning, and CLR moves to the end. The RUN/STOP key causes a return to normal operation. It is also possible to invoke 'C= R' and 'C= P' from Review Mode to save data that has already been received. The storing or printing will start from the line currently displayed at the TOP of the screen and continue till the end of the buffer. Review Mode is then automatically left, and storing/printing continues with live text.

Memories

The programmable and fixed memories are inserted in the Keyboard Buffer with CTRL-1 to CTRL-0. Keys 1 to 4 give the programmable memories, and 5 to 0 give "CQ", "SelCal is", "Pse K", "QBF", "RY" and "Time is" messages. In addition, CTRL with '+' or '-' gives the callsign or SelCal respectively, as read from the PK-232.

4.2 PACKET OPERATION

When operating Packet, there are ten QSO channels available, each with a separate screen. There is a separate screen for monitored data. To switch between channels, use the 'C=' key together with a top row key '<-' to '0', which correspond to channels 0 to 9 and monitor, as shown on the keyboard overlay. When data arrives on a channel not currently being displayed, an indicator number flashes on the lower status line to alert the user.

The upper status line shows either 'MONITOR' or the channel in use as follows:

CH.a Sb Vc Ud Te Connect-Path

where: a is the channel 0-9
 b is the AX.25 state (see PK-232 manual), shown as 0-9, A-F
 c is the AX.25 version being used, 1 or 2
 d is the no. of unACKed packets, 0-7
 e is the no. of retries made, 0-9, A-F

The "Connect-Path" shows as much of the connected path as can be displayed on the one line. If the connect path changes at the request of either station, it will be shown on the screen.

If text is typed and sent to a channel which has no current connection, it will be transmitted as UI frames to the UNPROTO path.

Note that when displaying the MONITOR 'channel', it is not possible to enter text into the Keyboard Buffer, and the CONNECT and DISCONNECT keys are inoperative.

Function key assignments are as follows:

f1 - MHEARD
Displays a continuously-updated MHEARD list. Exit with the RUN/STOP key.

f2 - MBX
Displays the current MBX callsign (see PK-232 manual) and prompts for a new callsign. Enter a '%' to undo the MBX function, or RUN/STOP to exit without changing.

f3 - MONITOR
Displays the current MONITOR level 0-6, and accepts a new value 0-6. To exit without changing, press RUN/STOP.

f4 - MCON
Displays the current MCON level 0-6, and accepts a new value 0-6. To exit without changing, press RUN/STOP.

f5 - CONNECT
Displays the current Connect Path in full, if any, and prompts for a new Connect Path. This is used to initiate a connection or to change the path if already connected. To exit without any action, press RUN/STOP.

f6 - UNPROTO
Displays the current UNPROTO path in full, and prompts for a new path. To exit without changing, press RUN/STOP.

f7 - DISCONNECT
Initiates a disconnect on the current channel.

f8 - CBELL
Turns the connect alarm ON or OFF.

CTRL f1 - CTEXT
Displays the current Connect Text, and prompts for new text. Use in the same way as 'C= W'. The RUN/STOP key exits without changing.

C= f1 - CMSG
Turns transmission of the Connect Text ON or OFF.

CTRL f3 - MSTAMP
Turns time-stamping ON or OFF in monitored frame headers.

C= f3 - MDIGI
Turns monitoring of frames digipeated by your station ON or OFF. If ON, they are monitored irrespective of the settings of MONITOR and MCON.

CTRL f5 - CONPERM
Turns the Permanent attribute ON or OFF for the current connection. No effect when disconnected. When CONPERM is ON, a 'P' is displayed in the upper status line before the connect-path.

C= f5 - PACLEN
Displays the current value of PACLEN (maximum packet length), and allows a new value to be entered, followed by RETURN. To exit without changing, press RUN/STOP.

CTRL f7 - HF/VHF
This key toggles between HF and VHF operation. It changes both the tone pair in use (VHF ON or VHF OFF), and the HDLC baud rate (HBAUD 1200 or HBAUD 300) accordingly.

C= f7 - XMITOK
Turns the PTT-enable ON or OFF. When OFF, the PK-232 will never key the rig to transmit.

4.3 AMTOR OPERATION

When operating Amtor there is only one Receive Buffer. The upper status line shows RECEIVE, and the lower status line shows the current Amtor mode: AMTOR (standby), FEC, SELFEC, ALIST or ARQ. Text typed into the Keyboard Buffer is sent to the PK-232 as soon as a non-alphanumeric character is entered. The PK-232 stores this text in its own transmit buffer, where it will be transmitted when the PK-232 is placed in the 'Send' mode.

Function key assignments are as follows:

f1 - RX FEC ON/OFF
Turns the display of received FEC transmissions ON or OFF.

f2 - ARQ BREAK-IN (ACHG)
Changes immediately to the 'Send' state - the distant station will automatically go to 'receive', and the PK-232 will transmit any text in its transmit buffer.

f3 - FEC TRANSMIT
Changes to FEC transmit mode, and begins sending data from the transmit buffer.

f4 - LETTER SHIFT
Forces incoming text to letter-shift, in case of corruption due to interference or fading.

f5 - ARQ CALL
Displays a window allowing a 4-letter SelCal to be entered, and then initiates an ARQ call to that SelCal.

f6 - TX CLEAR
Sends a TCLEAR command to the PK-232 to clear its transmit buffer, and clears the Com Pakratt Keyboard Buffer as well.

f7 - STANDBY
Inserts a Control-D into the Keyboard Buffer, which causes a return to Amtor Standby when all the preceding text has been sent.

f8 - STANDBY with CWID
Inserts a Control-F into the Keyboard Buffer, which acts like Control-D, and then sends the CW identification.

CTRL f1 - RXREV
Turns inversion of the received Mark and Space tones ON or OFF.

C= f1 - SRXALL
Turns reception of SelFec calls to other stations ON or OFF.

CTRL f3 - TXREV
Turns inversion of the transmitted Mark and Space tones ON or OFF.

C= f3 - SELFEC TRANSMIT
Displays a window allowing a 4-letter SelCal to be entered, and then initiates a SELFEC call to that SelCal.

CTRL f5 - USOS
Turns UnShift-On-Space ON or OFF. When ON, incoming text will be forced into Letter Shift following the reception of SPACE, CR or LF.

C= f5 - ARQ LISTEN
Enters ARQ-Listen mode from AMTOR standby, or initiates re-synchronization if already in Listen mode.

CTRL f7 - WIDESHIFT
Changes between 1000Hz wide shift (ON) and 200Hz narrow shift (OFF).

C= f7 - ABORT (RECEIVE)
Forces an immediate return to AMTOR standby without waiting for any remaining text to be transmitted. A warning message will be displayed if there is still data remaining in the PK-232 transmit buffer.

4.4 BAUDOT OPERATION

When operating Baudot (RTTY) there is only one Receive Buffer. The upper status line shows RECEIVE, and the lower status line shows BAUDOT and the currently selected Baud rate. Text typed into the Keyboard Buffer is sent to the PK-232 as soon as a non-alphanumeric character is entered. The PK-232 stores this text in its own transmit buffer, where it will be transmitted when the PK-232 is in transmit mode.

Function key assignments are as follows:

f1 - BAUD UP
Increases the current Baud rate by one step. Steps are 45, 50, 57, 75, 100, 110, 150 and 300.

f3 - BAUD DOWN
Decreases the current Baud rate by one step.

f4 - LETTER SHIFT
Forces incoming text to letter-shift, in case of corruption due to interference or fading.

f5 - TRANSMIT
Turns the transmitter on, and begins sending any data in the transmit buffer.

f6 - TX CLEAR
Sends a TCLEAR command to the PK-232 to clear its transmit buffer, and clears the Com Pakratt Keyboard Buffer as well.

f7 - RECEIVE
Inserts a Control-D into the Keyboard Buffer, which causes a return to Receive when all the preceding text has been sent.

f8 - RECEIVE with CWID
Inserts a Control-F into the Keyboard Buffer, which acts like Control-D, and then sends the CW identification.

CTRL f1 - RXREV
Turns inversion of the received Mark and Space tones ON or OFF.

CTRL f3 - TXREV
Turns inversion of the transmitted Mark and Space tones ON or OFF.

CTRL f5 - USOS
Turns UnShift-On-Space ON or OFF. When ON, incoming text will be forced into Letter Shift following the reception of SPACE, CR or LF.

CTRL f7 - WIDESHIFT
Changes between 1000Hz wide shift (ON) and 200Hz narrow shift (OFF).

C= f7 - ABORT (RECEIVE)
Forces an immediate return to Receive without waiting for any remaining text to be transmitted. A warning message will be displayed if there is still data remaining in the PK-232 transmit buffer.

4.5 ASCII OPERATION

When operating ASCII there is only one Receive Buffer. The upper status line shows RECEIVE, and the lower status line shows ASCII and the currently selected Baud rate. Text typed into the Keyboard Buffer is sent to the PK-232 as soon as a non-alphanumeric character is entered. The PK-232 stores this text in its own transmit buffer, where it will be transmitted when the PK-232 is in transmit mode.

Function key assignments are as follows:

f1 - BAUD UP
Increases the current Baud rate by one step. Steps are 110, 150 and 300.

f3 - BAUD DOWN
Decreases the current Baud rate by one step.

f5 - TRANSMIT
Turns the transmitter on, and begins sending any data in the transmit buffer.

f6 - TX CLEAR
Sends a TCLEAR command to the PK-232 to clear its transmit buffer, and clears the Com Pakratt Keyboard Buffer as well.

f7 - RECEIVE
Inserts a Control-D into the Keyboard Buffer, which causes a return to Receive when all the preceding text has been sent.

f8 - RECEIVE with CWID
Inserts a Control-F into the Keyboard Buffer, which acts like Control-D, and then sends the CW identification.

CTRL f1 - RXREV
Turns inversion of the received Mark and Space tones ON or OFF.

CTRL f3 - TXREV
Turns inversion of the transmitted Mark and Space tones ON or OFF.

CTRL f7 - WIDESHIFT
Changes between 1000Hz wide shift (ON) and 200Hz narrow shift (OFF).

C= f7 - ABORT (RECEIVE)
Forces an immediate return to Receive without waiting for any remaining text to be transmitted. A warning message will be displayed if there is still data remaining in the PK-232 transmit buffer.

4.6 MORSE OPERATION

When operating MORSE there is only one Receive Buffer. The upper status line shows RECEIVE with the currently tracked receive speed, and the lower status line shows MORSE and the currently selected transmit speed. Text typed into the Keyboard Buffer is sent to the PK-232 as soon as a non-alphanumeric character is entered. The PK-232 stores this text in its own transmit buffer, where it will be transmitted when the PK-232 is in transmit mode.

Function key assignments are as follows:

f1 - WPM UP
Increases the current speed in Words-Per-Minute (WPM) by one step. Steps are 5 to 50 in 1 WPM increments, 50 to 95 in 5 WPM increments, with 99 WPM being the maximum speed.

f2 - UNLOCK SPEED
Unlocks the receive speed and allows it to track the received signal.

f3 - WPM DOWN
Decreases the current speed in Words-Per-Minute by one step.

f4 - LOCK SPEED
Locks the receive speed to its current value.

f5 - TRANSMIT
Turns the transmitter on, and begins sending any data in the transmit buffer.

f6 - TX CLEAR
Sends a TCLEAR command to the PK-232 to clear its transmit buffer, and clears the Com Pakratt Keyboard Buffer as well.

f7 - RECEIVE
Inserts a Control-D into the Keyboard Buffer, which causes a return to Receive when all the preceding text has been sent.

C= f7 - ABORT (RECEIVE)
Forces an immediate return to Receive without waiting for any remaining text to be transmitted. A warning message will be displayed if there is still data remaining in the PK-232 transmit buffer.

5.0 DISK OPERATIONS

To supplement the Send File and Receive File commands, a set of disk housekeeping functions is provided under the Disk Menu. The Disk Menu is called up from Split Screen mode using '**C=** D'. The screen will clear, and the Disk Menu will be shown below a header line.

The functions available are as follows:

$ - DIRECTORY
V - VIEW FILE
P - PRINT FILE
C - CONVERT FILE
L - LOAD MEMORIES
S - SAVE MEMORIES
@ - DISK COMMAND

The desired function is selected by pressing the key shown; no '**C=**' key is required. To exit from the Disk Menu, press the RUN/STOP key: normal Split Screen operation will be resumed, and any text received during the Disk Menu operations will then be sent from the PK-232.

Each function will be described in turn.

5.1 $ - DIRECTORY

This function displays the disk directory on the screen. The first line (disk name) is shown in the highlight color, and the rest in the normal color. The listing will pause after displaying one page, at which time pressing the SPACE bar will display the next page, pressing RETURN will just display the next line, and RUN/STOP will return to the Disk Menu.

5.2 V - VIEW FILE

This function allows the contents of an ASCII file to be displayed on the screen. A window is shown prompting for a file name. Enter the name followed by RETURN. As in the DIRECTORY display, the listing will pause after displaying one page, at which time a SPACE will display the next page, a RETURN will just display the next line, and RUN/STOP will return to the Disk Menu.

5.3 P - PRINT FILE

This function allows the contents of an ASCII file to be sent to the Commodore printer. A window is shown prompting for a file name. Enter the name followed by RETURN. The characters are converted to Commodore standard codes before being printed. The printing may be aborted using the RUN/STOP key.

5.4 C - CONVERT FILE

This function allows files to be converted to and from ASCII format, so that word-processor files may be sent as ASCII, and received files may be input to a word-processor program such as Vizawrite or Easyscript. A window is shown prompting for the name of file to be converted. Enter the name followed by RETURN. Do the same for the destination file, which must have a different name. The file being converted is listed on the screen as it is done. The conversion may be aborted using the RUN/STOP key: all files will be closed properly. Three conversions are provided:

V - Vizawrite to ASCII
This takes a standard Vizawrite document file (PRG type), and converts it to ASCII. It discards any control codes and converts page breaks to RETURNs. It also ignores format lines, TABs and indents.

C - Commodore to ASCII
This takes a standard Commodore sequential file, such as an Easyscript file or LISTed program file, and converts it to ASCII. It does not take any special action with Easyscript control codes, so they should not be included in the file.

A - ASCII to Commodore
This takes an ASCII file, such as a file received off the air with this program, or a VIPTERM file, and converts it to standard Commodore sequential file format, for reading into a word-processor. It may be loaded into Easyscript directly, and it may be Merged into a (possibly empty) Vizawrite document using the Merge command with a "from page" of "s".

5.5 L - LOAD MEMORIES

This function allows the four programmable text memories and the screen colors to be loaded from a file previously saved to disk. A window is shown prompting for a file name. Enter the name followed by a RETURN.

5.6 S - SAVE MEMORIES

This function allows the four programmable text memories and the current screen colors to be saved to a disk file for later reloading. A window is shown prompting for a file name. Enter the name followed by a RETURN.

5.7 @ - DISK COMMAND

This function allows any 1541 DOS command to be entered, for deleting files, renaming files, formatting disks, etc. The command should be typed exactly as it would normally follow the '@' or '>' when using the DOS wedge. Note that the command '$' cannot be given to list a directory, since this is not actually a command to the disk drive. The RUN/STOP key will exit from this function without issuing a command.

6. TROUBLESHOOTING

If you are experiencing problems communicating with the PK-232, the first thing to do is to check <u>all</u> connections. Make sure that the cartridge is correctly inserted; check that the PK-232 Converter is firmly seated in the User Port, and check that the RS-232 I/O cable is wired correctly and connected to the PK-232.

If the title screen re-appears after pressing RETURN, that means the PK-232 is no longer in Host Mode, and is therefore not responding to the polling of the Computer. The most likely cause of this is switching off the computer with the RS-232 still connected to the PK-232. This should not be a problem if you have 25.JUN.87 or later firmware installed in the PK-232, but go back and read carefully the part of section 4.1 regarding 'C= Q', the Quit command.

Having pressed 'T' to enter Terminal Mode, press CTRL-C 3 times (hold down CTRL and press C 3 times). The "cmd:" prompt should appear. If it does not, press CTRL-Q. Then again press CTRL-C 3 times. If no response, type the following sequence of characters:

```
CTRL-A CTRL-A O H O N CTRL-W
```

Note that all the letters must be capitals - use the SHIFT key to be sure. If the "cmd:" prompt still does not appear, switch the PK-232 off and on again, while the computer is still in the Dumb Terminal mode. The signon message should appear. If it does, check the parameter settings as described in section 2.2, and use 'C= H' to enter split-screen mode.

If it is still impossible to get any response, it may be that the Baud rate of the PK-232 is wrong. The only way to recover from that is to reset the PK-232 from cold by removing the battery backup (see section 2.0). It is best to wait a couple of minutes before re-connecting the batteries and trying again.

If all else fails, you may call or write the AEA Service Department. We are available on the telephone at (206) 775 - 7373 during the hours of 8:00 - 12:00 am and 1:00 - 4:30 pm Pacific Time.

KEYBOARD OVERLAYS

CTRL	MORSE	NORMAL
C=		SHIFT
		WPM UP
		UNLOCK SPEED
		WPM DOWN
		LOCK SPEED
		TRANSMIT
		TX CLEAR
		RECEIVE
ABORT		

COM PAKRATT (C) 1987 ICS Electronics Ltd.

CTRL	AMTOR	NORMAL
C=		SHIFT
RXREV		RX FEC ON/OFF
SRXALL		ARQ BREAK-IN
TXREV		FEC TRANSMIT
SELFEC TX		LETTER SHIFT
USOS		ARQ CALL
ARQ LISTEN		TX CLEAR
WIDESHIFT		STANDBY
ABORT		STBY + CWID

COM PAKRATT (C) 1987 ICS Electronics Ltd.

CTRL	BAUDOT	NORMAL
C=		SHIFT
RXREV		BAUD UP
TXREV		BAUD DOWN
		LETTER SHIFT
USOS		TRANSMIT
		TX CLEAR
WIDESHIFT		RECEIVE
ABORT		RX + CWID

COM PAKRATT (C) 1987 ICS Electronics Ltd.

CTRL	ASCII	NORMAL
C=		SHIFT
RXREV		BAUD UP
TXREV		BAUD DOWN
		TRANSMIT
		TX CLEAR
WIDESHIFT		RECEIVE
ABORT		RX + CWID

COM PAKRATT (C) 1987 ICS Electronics Ltd.

KEYBOARD OVERLAYS

CTRL	MORSE	NORMAL
C=		SHIFT
		WPM UP
		UNLOCK SPEED
		WPM DOWN
		LOCK SPEED
		TRANSMIT
		TX CLEAR
		RECEIVE
ABORT		

COM PAKRATT (C) 1987 ICS Electronics Ltd.

CTRL	AMTOR	NORMAL
C=		SHIFT
RXREV		RX FEC ON/OFF
SRXALL		ARQ BREAK-IN
TXREV		FEC TRANSMIT
SELFEC TX		LETTER SHIFT
USOS		ARQ CALL
ARQ LISTEN		TX CLEAR
WIDESHIFT		STANDBY
ABORT		STBY + CWID

COM PAKRATT (C) 1987 ICS Electronics Ltd.

CTRL	ASCII	NORMAL
C=		SHIFT
RXREV		BAUD UP
TXREV		BAUD DOWN
		TRANSMIT
		TX CLEAR
WIDESHIFT		RECEIVE
ABORT		RX + CWID

COM PAKRATT (C) 1987 ICS Electronics Ltd.

COM PAKRATT (C) 1987 ICS Electronics Ltd.

C= M - Mode Select
C= T - Terminal Mode
C= Q - Quit

C= R - Receive File
C= S - Send File
C= D - Disk Menu

C= P - Printer On
C= O - Printer/Disk Off
C= E - Logging Suspend/Resume

C= W - Write to Memory
C= B - Buffer Usage
C= E - Echo Tx On/Off

CRSR Up - Review Buffer
CRSR Rt - >>> (Packet)
 - +? (AMTOR)

CTRL		Memory 1	Memory 2	Memory 3	Memory 4	CQ CQ	SelCal is	Pse K	RYRYRY	Q B F	Time is	Callsign	SelCal
C=	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5	Chan 6	Chan 7	Chan 8	Chan 9	Monitor		

CTRL	PACKET	NORMAL
C=		SHIFT
CTEXT		MHEARD
CMSG		MBX
MSTAMP		MONITOR
MDIGI		MCON
CONPERM		CONNECT
PACLEN		UNPROTO
HF/VHF		DISCONNECT
XMITOK		CBELL

COM PAKRATT (C) 1987 ICS Electronics Ltd.

Advanced Electronic Applications, Inc.
P.O. Box C2160
2006 196th Street SW
Lynnwood, WA 98036
Tel: (206)774-5554
Fax: (206)775-2340

U.S. Amateur Radio Retail Price List

Effective January 1, 1994

Data Controllers

	Sugg. List
PK-96 9600 Baud Packet Controller with 14K MailDrop	$ 229
PK-96 9600 Baud Packet Controller with 100K Mail Drop	279
100K MailDrop Option for PK-96	50
PK-88 RS-232 Compatible, Packet Only	149
PCB-88 IBM Compatible Packet Plug-in Board w/ Software and Power Supply	179
PK-232MBX Pakratt, CW/RTTY/ASCII/AMTOR/Packet/FAX/NAVTEX/PACTOR, Mailbox & Gateway	379
PK-900 Dual Port, CW/RTTY/ASCII/AMTOR/Packet/FAX/NAVTEX/PACTOR, Mailbox & Gateway	569
9600 bps Option for PK-900/User-Installed Plug-in Modem Card	75
AEA-FAX II 900 PK-900/IBM PC Software for Gray Scale FAX	75
DSP-1232 Single Channel Multi-Mode DSP Data Controller with PACTOR & Gateway	789
DSP-2232 Dual Channel Multi-Mode Data Controller with PACTOR & Gateway	999

Support Software

PC-Pakratt II™ with FAX, IBM Terminal Program with PACTOR support	$ 69
PC-Pakratt-88™ Packet-only Terminal Program	49
COM-Pakratt™ with FAX, C-64 Terminal Program	79
MacRATT™ with FAX, Macintosh Terminal Program	69
PC-Pakratt for Windows™ Windows™ based Terminal Program for all AEA Data Controllers	129
AEA-FAX II Gray Scale WEFAX Demodulator	149
Log Windows™ Windows™ Based Logging, Rig Control, DX Cluster Interface, and Award Tracking	99
AEA WeFax 256 Windows™ Gray Scale Fax Receiving and Editing Software for the DSP-2232/1232	129

Remote Radio Controllers

HL-60 HamLink Telephone Control for Icom, Kenwood and Yaesu HF Rigs	$ 269
Radio Link HF Rig Remote Control via Handheld	329
OL-80 OpLink HamLink Accessory for High-Speed CW and Stereo Headsets	130
The Silencer External Speaker with DTMF Decoder for Selective Call	100
Digitalker Battery Operated Freq. Counter with Digitized Voice Output for VHF/UHF	250
HL-61 Icom Interface Cable for HamLink/RadioLink	50
HL-62 Kenwood Interface Cable for HamLink/RadioLink	50
HL-63 Yaesu Interface Cable for HamLink/RadioLink	60

Miscellaneous

KK-1 Keyboard Keyer Shares Keyboard with Your Computer	$ 199
MM-3 Morse Machine™ Keyer/Trainer	189
SWR-121 HF Graphical Antenna Performance Analyst	399
SWR-121 V/U Graphical Antenna Performance Analyst	469
AACOM Optional Utility Program for the SWR-121	75
Carrying Case Nylon Bag with Convenient Belt Loop	29
AVT Master Amiga Video Terminal for Slow-Scan TV	319
ST-1 Satellite Tracker	399

Antennas

	Sugg. List
IsoLoop™ Model 10-30 MHz HF (Includes Controller, 50 ft Shielded Controller Cable)	$ 389
IT-1 IsoTuner Automatic Tuner for the IsoLoop 10-30	279
430-16 16 Element Yagi 420-450 MHz	119
IsoPole™ 144 for Base Stations	59
IsoPole™ 220 for Base Stations	59
IsoPole™ 440 for Base Stations	89
HR-1 Hot Rod™ 1/2 Wave 2M for Handhelds	24
HR-2 Hot Rod™ 1/2 Wave 220 MHz for Handhelds	24

Cables

PK-232 Radio Cable 5 ft. Open Ended	$ 9
KH Cable PK-232 to Kenwood Handheld	25
IH Cable PK-232 to Icom, Yaesu or Alinco Handheld	25
IW Cable PK-232 to Icom W2A Handheld	25
KM Cable PK-232 to Kenwood or Alinco 8-pin Mic	25
KA Cable PK-232 to Kenwood 13-pin ACC2	30
IM Cable PK-232 to Icom 8-pin Mic	25
YM Cable PK-232 to Yaesu 8-pin Mic	25
RS-232 "Y" Cable	39
IsoLoop 50 ft. Controller Cable with M/F Connectors	29
IsoLoop 100 ft. Controller Cable with M/F Connectors	39

Accessories

AC-1 12 VDC, 1/2 Amp Wall Adapter	$ 21
AC-4 12 VDC, 1 Amp Wall Adapter	32
DC-1 Power Cord with Cigarette Lighter Plug	7
PK-232 Operating Manual	25
PK-232 Technical Reference Manual	25
World Clock	25

All prices are subject to change without notice or obligation.
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AEA Computer Patch™ Interface model CP-I

BARRY ELECTRONICS CORP.
512 Broadway
New York, N. Y. 10012
WAlker 5-7000 area code: 212

Now you can easily convert your personal computer and transceiver into a full function RTTY station with the new CP-1 Computer Patch™ interface by AEA and appropriate AEA software and cabling. The CP-1 is a professional quality RTTY/CW terminal which cuts no corners on sensitivity, selectivity, and reliability. Software packages include split screen operation and large type-ahead and message (brag) buffers at all the common RTTY and CW speeds.

Advanced Electronic Applications, Inc.
Computer Patch™ Interface
FILTER
TUNE
Model CP-1

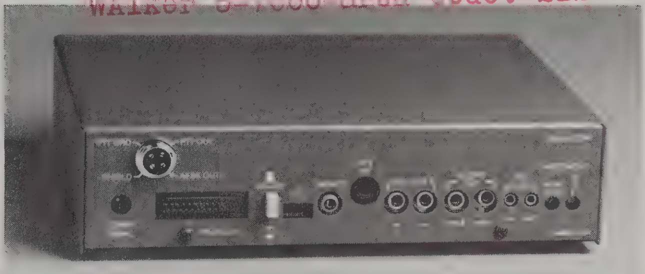
The CP-1 Computer Patch™ is easy for an inexperienced RTTY operator to hook up and operate, but will still appeal to the more experienced and sophisticated RTTY user. The CP-1 is a moderately priced, high performance, feature packed unit, which utilizes reliable innovative design in the style you have come to expect from Advanced Electronic Applications. It is priced competitively with other popular units, but includes many extras not offered by them.

With the tremendous price drop in personal computers, your total system cost is far below that of dedicated RTTY/CW systems which offer few, if any, additional features. No computer programming knowledge is required to use the CP-1 with your computer and you will still have the opportunity to use your personal computer for a variety of unrelated functions.

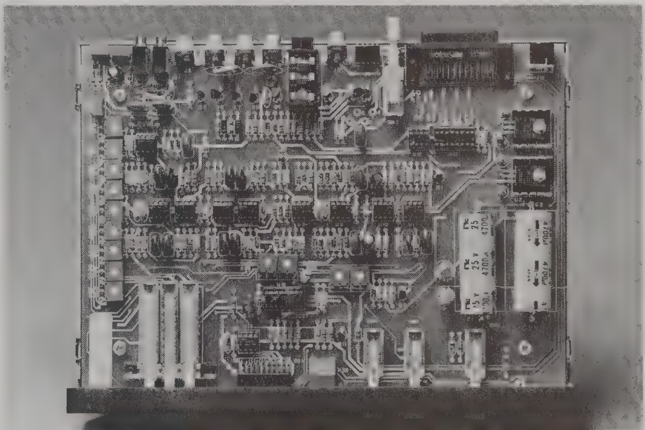
The CP-1 demodulator provides greatly improved performance compared to popular single channel RTTY detectors. An easy to use AEA magic-eye bargraph tuning indicator gives the closest thing to scope tuning, but separate Mark/Space scope output jacks are also provided. A state-of-the-art multi-usage active filter is incorporated offering pre and post limiter filtering. Floating comparator (automatic threshold) circuits give the best possible copy under fading and weak signal conditions.

Additionally, the CP-1 offers a variable receiver shift capability for any shift from 100 to 1000 Hz with a NORMAL/REVERSE tone selector switch on the front panel.

A function generator chip is utilized for clean, stable sine wave AFSK tone output to the transmitter. Both plus (+) and minus (-) keyed output jacks are provided for CW keying of virtually any popular transceiver. Automatic transmit/receive switching is available under computer control or from a front panel manual transmit button. Output and computer control signals are available in the usual TTL levels (or RS-232 format with an optional low cost RS-232 kit).



Power requirement for the CP-1 is 16 VAC which is provided by a 117 VAC wall adaptor unit supplied with the CP-1. The CP-1 Computer Patch™ is housed in an attractive all-metal enclosure with extensive R.F. filtering for minimal R.F. susceptability or radiation, far exceeding Part 15, subpart J, FCC requirements. The CP-1 measures 10″ wide x 2¾″ high x 8¼″ deep and weighs approximately 1½ pounds.



For software package information, please ask your dealer or contact AEA. Take advantage of the new low cost/high performance ratio and find out why RTTY is the fastest growing segment of amateur radio. See your favorite dealer for a demonstration of the CP-1 today.

Prices and specifications subject to change without notice or obligation.

AEA Brings you the Breakthrough!

Advanced Electronic Applications, Inc. • P.O. Box C-2160 • Lynnwood, WA 98036 • (206) 775-7373 • Telex: 152571 AEA INTL

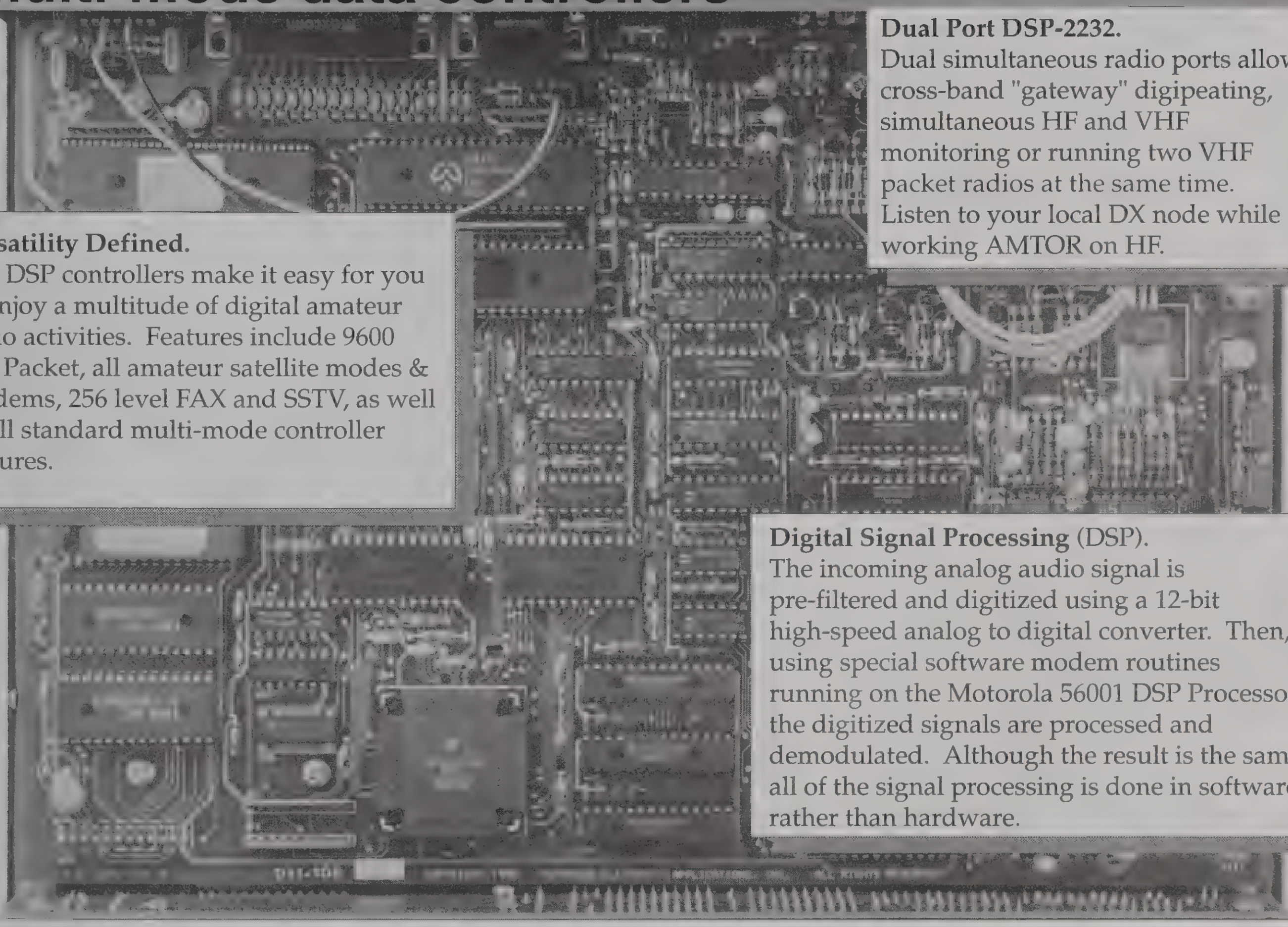
Barry 212 925-7000

The Inside Story

Connect with us

DSP-2232 and DSP-1232

multi-mode data controllers



Dual Port DSP-2232.
Dual simultaneous radio ports allow cross-band "gateway" digipeating, simultaneous HF and VHF monitoring or running two VHF packet radios at the same time. Listen to your local DX node while working AMTOR on HF.

Versatility Defined.
The DSP controllers make it easy for you to enjoy a multitude of digital amateur radio activities. Features include 9600 bps Packet, all amateur satellite modes & modems, 256 level FAX and SSTV, as well as all standard multi-mode controller features.

Digital Signal Processing (DSP).
The incoming analog audio signal is pre-filtered and digitized using a 12-bit high-speed analog to digital converter. Then, using special software modem routines running on the Motorola 56001 DSP Processor, the digitized signals are processed and demodulated. Although the result is the same, all of the signal processing is done in software rather than hardware.

The DSP controllers from AEA represent a comprehensive solution for amateurs who are putting together a complete digital amateur radio station. There is no need for additional equipment for satellites, high-speed modems or new modes. New modems will only require an EPROM change. The DSP hardware was designed to defeat obsolescence once and for all.

AEA has over 10 years of experience in developing multi-mode data controllers, and that experience shows in the DSP-2232 and 1232. A true multi-mode controller, the DSP handles Packet, AMTOR/SITOR, Baudot, ASCII, Morse Code, WEFAX, NAVTEX and more. AEA's experience in this field is important, as modes like AMTOR simply cannot be implemented overnight. The program code in the DSP controllers is the end result of many years of fine tuning.

As with all AEA products, the DSP controllers are covered by a 1 year warranty for parts and labor, though chances are you'll never have to use it.

If you're looking for a highly advanced, full featured multi-mode controller that won't become obsolete when you open the box, then you owe it to yourself to pick up a DSP controller from AEA.

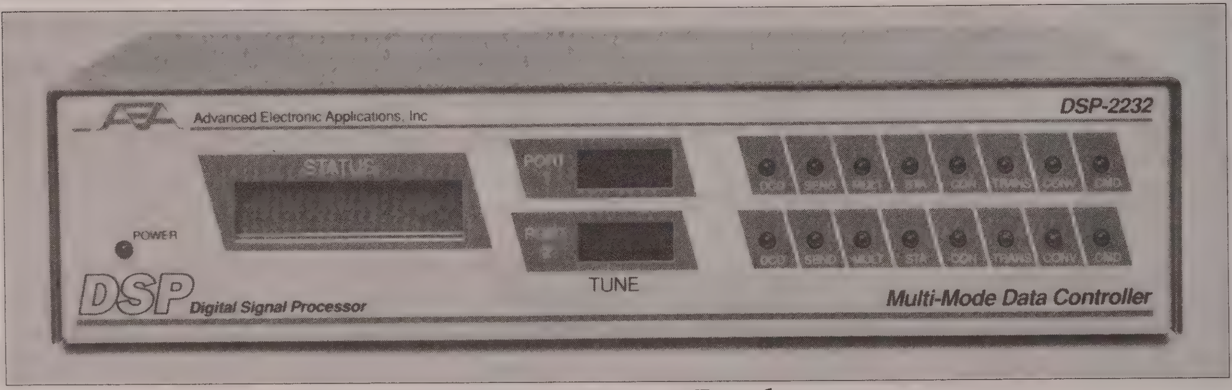
Over 30 Individually Optimized DSP Modems for Unsurpassed Versatility

In the early days of multi-mode controllers, a typical demodulator consisted of a circuit board, an op-amp or two and several resistors and capacitors. This approach worked well, but if different modem characteristics were desired, you either had to buy another unit or get out the soldering iron. Then, you couldn't go back. Changing modems or modem characteristics was difficult, to say the least.

Those days are over. By running the incoming analog data signal through an Analog to Digital converter, the digitized signal can be processed by a computer, like any other digital data. Special software routines can be created to perform better than the hardware modems of old. Using a specialized computer (the Motorola DSP 56001), these software filter demodulation routines convert the digitized FSK, PSK and even analog data to the digital signal needed for protocol conversion. Also, like any other software program, these modems can be written to disk, burned onto an EPROM or sent and received by other modems via telephone or even ham radio.

In addition, instead of having two or three modems, DSP technology makes it possible for a multi-mode controller to have dozens of modems built in, providing incredible versatility. AEA's DSP-1232 and DSP-2232, using this state of the art technology, contain the following modems:

RTTY/TOR 170, 425 and 850 Hz Shifts	Cover the three most common tone shifts for FSK RTTY operation
Packet 300 and 1200 Baud FSK	Provide "standard" packet operation on HF and VHF
Packet 2400 bps DPSK	For operating the newer DX spotting nets and "packet clusters"
Packet 4800 bps PSK terrestrial and PACSAT	Phase Shift Keying modems for 4800 bps
Packet 9600 bps FSK	High-speed packet modems patterned after the G3RUH/K9NG design
Morse 750 Hz	Optimized DSP modem for decoding Morse code signals
Analog FAX HF, FAX APT and SSTV	Analog modems provide up to 256 shades of gray or colors with appropriate application software
DSP data 400 bps OSCAR-13, etc.	Unique data modem for satellite telemetry work
RTTY/TOR 1200 ASCII OSCAR-11	1200 bps FSK modem for receiving from the OSCAR-11 satellite
DSP Data Spectrum	Another unique DSP modem which can be used for audio spectrum analysis with appropriate application software


Advanced Electronic Applications, Inc
DSP-2232
STATUS
POWER
TUNE
DSP Digital Signal Processor
Multi-Mode Data Controller

DSP-2232 Front Panel

Cost-Effective Solutions for Your Multi-Mode Controller Needs

The DSP-2232 and DSP-1232 represent an excellent value in full featured multi-mode data controllers. Considering the number of external modems that would be required to allow a non-DSP multi-mode controller to handle all of the satellites as well as high speed Packet, etc., AEA's DSP controllers can save a considerable amount of space and money.

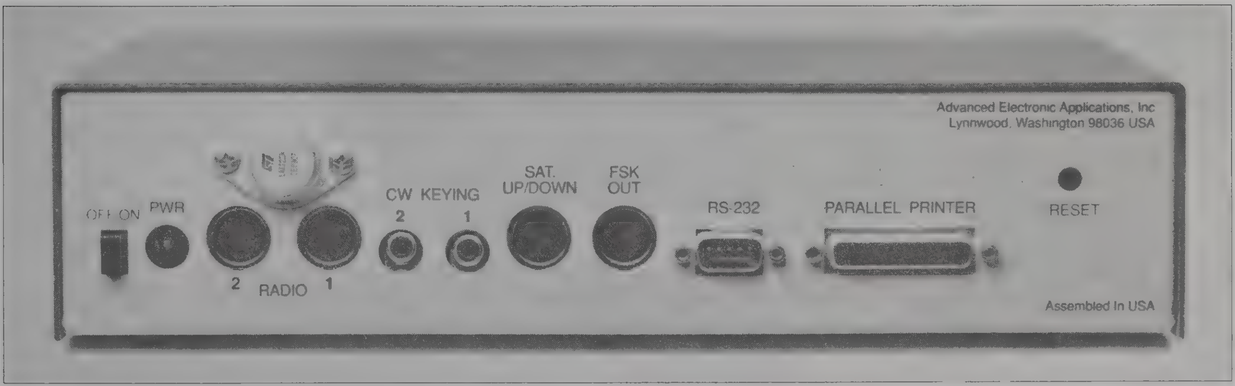
Keep in mind that the DSP's modems are ready to use. You don't need to perform any complicated, frustrating installations which can't be guaranteed to work. The DSP's many modems are just a keystroke away, always ready to go when you are.

The following is an itemized list of the costs involved in piecing together a DSP compatible system. Note: Many of the following items are available only in kit form, and require some amount of assembly.

ITEM	COST (APPROXIMATE)
Multi-Mode Controller	$ 379
PSK Satellite Modem	229
9600 bps Modem	175
State Machine DCD Modification (kit)	15
Modem Disconnect Header (kit)	20
256 Grays/Colors FAX/SSTV demodulator	319
AM-FM Converter for APT FAX	99
2400 bps DPSK modem	130
Total Cost	$1,366

In addition, no additional power supplies are required. All the features of the DSP controllers require just one 12 VDC, 1.5 amp or better power supply.

The DSP controllers, at $800 for the DSP-1232 and $999 for the DSP-2232, are a very cost-effective multi-mode solution. For the amateur who doesn't want to be limited to standard Packet and RTTY, purchasing a DSP controller can save you up to $500 or more, not to mention several square feet of valuable ham shack real estate!



DSP-1232 and 2232 Rear Panel

DSP-2232 and DSP-1232

Multi-Mode Data Controllers

specifications

Modulator/Demodulator:	Motorola 56001 Digital Signal Processor (DSP) running at 24 MHz
DSP RAM:	24K bytes (may hold up to two user-uploaded modems)
DSP ROM:	Up to 128 K bytes of DSP modems may be stored and are loaded by the Z-180
Analog to Digital Converter:	AD7870 12-bit ADC
Digital to Analog Converter:	AD767 12-bit DAC
Available ROM Modems:	300 bauds HF Packet FSK 2110/2310 Hz also 1260/1460 Hz 1200 bauds VHF Packet FSK 1200/2200 Hz 2400 bps Packet DPSK 1200 bps Satellite BPSK HF RTTY FSK 2125/2295 and 1445/1275 Hz also 2125/2550, 1275/2125, 2125/2975 Hz Morse 750 Hz center frequency Facsimile, FM and APT 256 gray levels (with appropriate application software) FM SSTV compatible 256 level 9600 bps FSK K9NG Compatible 1200/4800 bps ASCII Satellite RX Dual Port 300/1200 and 1200/1200 Packet Dual Port RTTY-TOR/1200 baud Packet
Output Level:	5 to 100 millivolts RMS into 600 ohms, adjustable for each channel using side-panel controls
Protocol Conversion:	Zilog Z-180 microprocessor
RAM:	64K bytes
ROM:	Up to 384K bytes of ROM may be used (128K dedicated to DSP ROM modems leaving 256K for Z-180 programs)
Hardware HDLC:	Zilog Z-8530 SCC
Radio Interface:	Two five-pin DIN connectors, simultaneous operation on the DSP-2232, software selectable on the DSP-1232
Input/Output Lines:	Receive audio Transmit audio +/- push-to-talk (PTT) (+25/-40 VDC) External squelch input Ground
Direct FSK Outputs:	Normal and reverse for each radio port
CW Keying Outputs:	Positive: +100 VDC max, at up to 100 mA Negative: -30 VDC max at up to 20 mA
Terminal Interface:	RS-232-C 9-pin DB-9P connector RS-232-C with full handshake (hardware and software)
Terminal Data Rates:	Autobaud selection of 110, 300, 600, 1200, 2400, 4800, 9600 and 19200 bps. TBAUD adds 150, 200, 400 and 38400 bps.
Parallel Printer Port:	IBM compatible 25-pin bi-directional parallel port (DB-25 connector)
Tuning Indicator:	Ten-segment discriminator-type bargraph indicator for tuning of each radio port
Power Requirements:	+13 VDC (12 to 16 VDC) at 1100 mA
Physical:	Overall, 12" x 9.8" x 2.9" (305mm x 249mm x 74 mm) Weight 3 lb. 12 oz. (1.69 kilograms)

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PO Box C2160 / 2006 196th St. SW Lynnwood, WA 98036 U.S.A.
Sales (206) 774-5554   Fax (206) 775-2340
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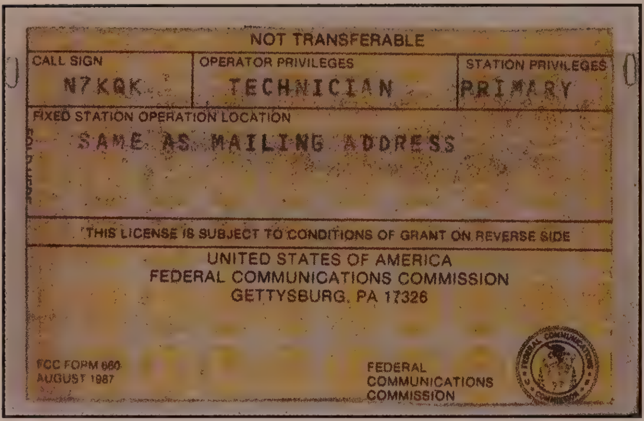
RADIO AMATEURS MAP OF NORTH AMERICA
N7KGD
N7KRB
ATV
THE ARRL HANDBOOK FOR THE RADIO AMATEUR
1988
TUNE IN THE WORLD WITH HAM RADIO
QEX

ADVANCED ELECTRONIC APPLICATIONS, INC.
P.O. Box 2160
Lynnwood, Washington 98036 USA
206-775-7373

This is an Amateur Radio License



NOT TRANSFERABLE

CALL SIGN	OPERATOR PRIVILEGES	STATION PRIVILEGES
N7KQK	TECHNICIAN	PRIMARY

FIXED STATION OPERATION LOCATION

SAME AS MAILING ADDRESS

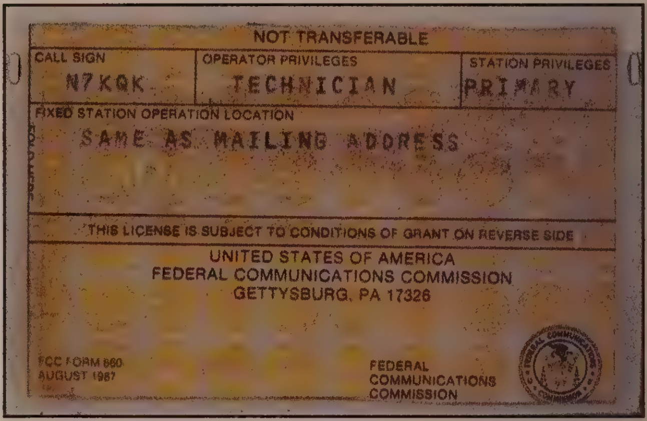
THIS LICENSE IS SUBJECT TO CONDITIONS OF GRANT ON REVERSE SIDE

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
GETTYSBURG, PA 17326

FCC FORM 660
AUGUST 1987

FEDERAL
COMMUNICATIONS
COMMISSION

This is an Amateur Television License



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CALL SIGN N7KQK
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STATION PRIVILEGES PRIMARY

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UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
GETTYSBURG, PA 17326

FCC FORM 660
AUGUST 1987

FEDERAL
COMMUNICATIONS
COMMISSION

That's right, they are exactly the same. Your technician or higher class amateur radio license gives you the right to own and operate your own amateur television station.

It's Easy....

If you can operate a video camera, you can operate the new AEA Model FSTV-430. The FSTV-430 transceiver connects to the video output of your camera and transmits and receives live or taped video and audio. You can even use two cameras for studio-like operation from your shack.

Inexpensive...

The video camera or camcorder you bought is the most expensive part of a fast scan television system. The AEA Model FSTV-430 is the only transceiver you need. Connect the camera, a 430 MHz antenna, (an amplifier if you want stronger signals) and you're on the air.

And Fun....

Think about it. You can share more than just conversation with your amateur friends. Show your friends the new transceiver you bought, that special antenna you're working on, a schematic of your latest project, or just chew the fat.

Fast Scan Television with the new FSTV-430 from AEA gives you live, color television that rivals broadcast quality. In fact, the AEA Vestigial Sideband (VSB) technique is similar to that used by broadcasters.

Specifications:

General:
- Dimensions: 7.4" W x 2.8" H x 8.3" D
- Case: Sheet metal, painted
- Weight: 2 lbs. - 3 oz.
- Power: 12-14 VDC 1.2 amps in transmit
- Antenna connection: BNC

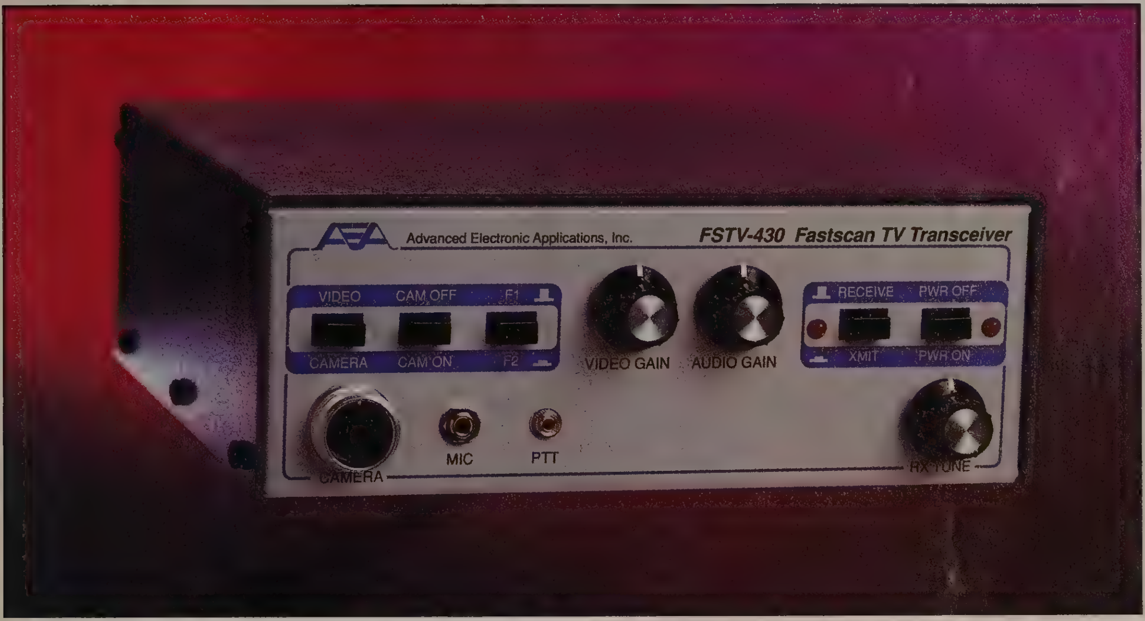
Transmitter:
- Power output: 1 watt (sync peak)
- Modulation: FM (audio), (video) VSB
- Frequency: F1=434 MHZ (supplied) F2=421.25 or 426.25 MHZ (optional)

Controls and Functions:

Back Panel:
- DC power input jack: 12-14 VDC - 2.1 mm Center Pin Positive
- Antenna connector: BNC (Antenna must be connected when in transmit)
- TV connector: F type for direct monitoring on channel 3 or 4
- Audio Input: RCA connector, to audio out of VCR
- Video Input: RCA connector, to video out of VCR

Front panel:
- Video/camera input switch: Choose between camera or VCR
- Camera power switch: on/off
- Frequency selector switch: F1/F2
- Transmit/Receive switch with LED
- Power switch with LED to indicate power on
- Camera jack: standardized 10 pin video type
- Microphone jack: for separate or multi-audio input
- PTT push to talk jack: short to transmit when in receive mode
- Receiver tuning knob: tune for best reception
- Video gain knob, Audio gain knob

FSTV-430
Fast Scan Television Transceiver
Now in Production



In the last ten years AEA has become one of the best known names in amateur radio digital communications. With our multi-mode data controllers you can send and receive data in several digital modes from Morse to Packet.

Now AEA joins another growing segment of Amateur Radio....Amateur Television.

The new FSTV-430 fast scan television transceiver from AEA makes getting on ATV easy and inexpensive. Almost any video camera (including camcorders with a video output jack) can be used. Plug the camera into the FSTV-430, and connect to your 70 cm antenna. Use a standard television for displaying received signals, and you're on the air. Of course, using an amplifier will add range to your signal.

AEA engineering standards of high performance are evident in this new transceiver. The FSTV-430 has a sensitive UHF GaAsfet preamp with a crystal controlled, or variable tuning, downconverter and IF filter. Output is available on channel 3 or 4 for signal reception. The transmitter in the FSTV-430 uses a VSB (Vestigial Side Band) design to minimize adjacent channel interference. Two frequencies can be selected for transmission (one 434 Mhz crystal is included). Signal output is one watt p.e.p..

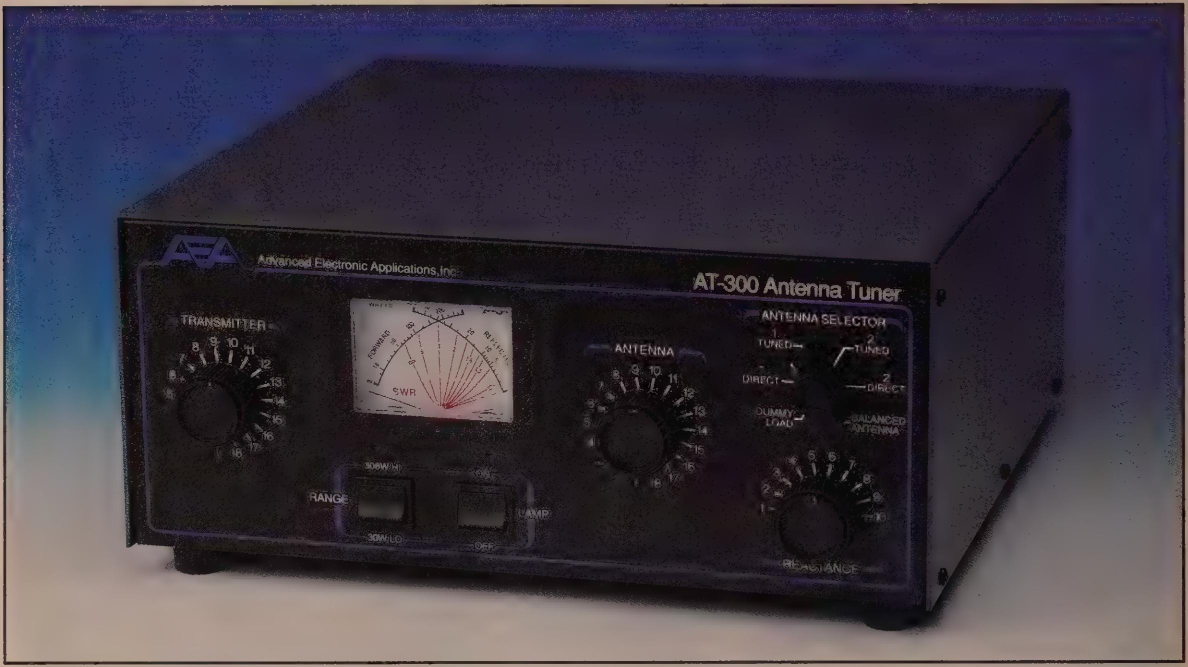
Any amateur with a technician class (or higher) license can join the fun of ATV. The FSTV-430 can transmit in either black and white or color. The portable, lightweight FSTV-430 transceiver can be used for in station or on the go operation from any 12 VDC source. You can even connect your VCR for transmission of video tapes.

If you own a video camera, you should be on amateur television. Why not use your amateur radio and video skills together. The FSTV-430 makes putting two hobbies together easy and fun. Contact your local AEA dealer today for more information about the AEA FSTV-430.

AEA Retail $499.95 **Amateur Net $439.95**

AT-300^tm Antenna Tuner

An affordable antenna tuner from a name you can trust
The AT-300^tm from AEA.



Low Pass Design

The low-pass design of the AT-300^tm is what you would expect from a company where **Engineering Makes the Difference**. The low-pass design means harmonic attenuation for lower TVI potential and allows matching a much wider range of antenna impedances than the common high-pass designs. While some manufacturers promote the small size of their tuners, AEA knows that smaller sizes degrade the inductors' Q (Quality factor), which results in less efficiency. Less efficiency means that for a given power output from your transmitter, less power will actually get to your antenna.

Easy Operation

The AT-300^tm tuner features a precision frequency compensated dual-movement SWR meter for ease of tuning. The high and low power front panel switch selects the proper range for the SWR meter. The internal balun and front panel selector switch allow for balanced and unbalanced outputs.

Specifications:

Front Panel Indicators and Controls:

Meter: Dual movement D'Arsonval cross needle power and SWR Meter

Controls:

Transmitter Tuning: 18 position
Antenna Tuning: 18 position
Reactance: Continuous
Antenna Selector: 6 position; Antenna 1 tuned and tuner bypass, Antenna 2 tuned and tuner bypass, Dummy load (External), Balanced Antenna
Power Switch: 2 position high/low
Lamp: light control for meter

Rear Panel Connectors:

Antenna 1: SO239 connector
Antenna 2: SO239 connector
Dummy load: SO239 connector
Transmitter Input: SO239 connector
Balanced Output: Ceramic feed-through insulators
Power: 12 VDC for meter lamp
AC-1 adapter available

Overall Dimensions:

5.8"H x 12.8"W x 15"D

AEA Retail $249.95 **Amateur Net $219.95**

The Morse Machine

The Ultimate Keyer from AEA

The Morse Machine has all the features you would expect in a memory keyer like 2-99 WPM speed selection and approximately 8,400 characters of memory stored in 20 memories. The 20 memories are soft partitioned so your stored messages may be as short or long as you like. Memory can be expanded to hold up to 36,000 characters. All memory is backed up by an internal lithium battery so once a message is loaded, it will stay until you write over it.

The Morse Machine has three ways to work on your code proficiency:

Proficiency Trainer - The same trainer used in the MorseMatic allows random code group practice with steadily increasing speed.

Random Word Generator - Randomly generates 4-letter words for a more realistic practice session.

Dr. QSO (tm) QSO Simulator - Based on our Dr. QSO program for the Commodore 64 computer. You can call stations, answer a CQ, or sit back and listen to realistic QSOs very much like those on-the-air.

The Morse Machine is a complete contest keyer with automatic serial number insertion and incrementing in any memory message. Use the front panel knob to adjust your sending speed or enter a precise speed with the keypad, toggling between the two at any time. Exchanges can be quickened by having parts of your message sent at a higher speed. You can add remote switches for 4 of the memories so that you can quickly send your response or call CQ.

The Morse Machine has an RS-232 I/O so that it can interface to a computer. Any front panel function may be programmed by the computer. The Morse Machine can also output data to a computer displaying your random code, or Dr. QSO practice sessions.

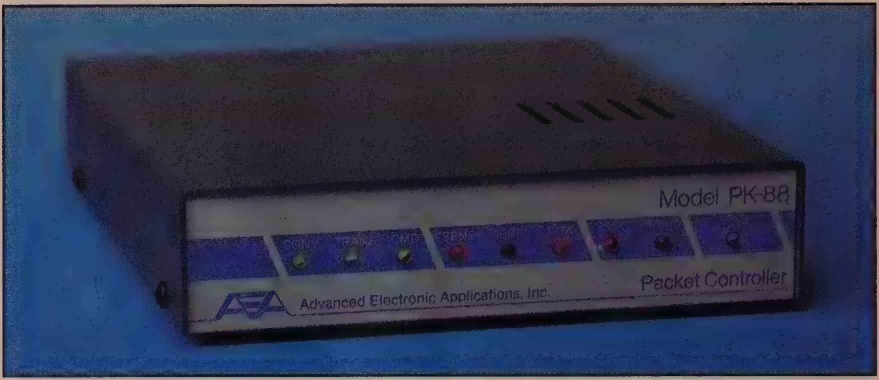
The Morse Machine can also be programmed to be an automatic beacon, automatically repeating a Morse (or RS- 232 ASCII) beacon at a programmed interval from 1 to 999 seconds.

Specifications:

- Keyer/Trainer speed range: 2 to 99 wpm.
- Memory: 8,192 bytes (approx. 8,400 chars.)
  32,768 bytes optional (43256)
- Keying Output: +50 Volts max., 500 mA max.
  -35 Volts max., 200 mA max.
- Computer I/O: RS-232 compatible(150-9600 baud)
- Serial Number Range: 1 to 9,999
- Beacon Time Range: 1 to 999 seconds
- Increase speed duration: 0.1 to 59.9 minutes
- Dot & dash memory On/Off: Program selectable
- Dot-space ratio: Programmable from 0.5 to 1.5
- Dash-space ratio: Programmable from 2.0 to 4.0
- Semiautomatic (bug) mode: Program Selectable
- Memory Keep-alive: Internal Lithium Battery
- Power Requirements: 9 - 16 VDC at 200 mA
- Dimensions: 7.4" W x 4.75 " D x 1.9" H

Price to be Announced

PK-88™ Packet Controller



Unique operating features with proven hardware and software design make AEA's PK-88 your best choice in packet radio. The new Maildrop feature of the PK-88 gives you the convenience of a personal mailbox. You can program 8K of memory in up to 15 different files with information that others can download. These files can be programmed for retrieval by specific callsign, or made available to all stations. Maildrop will also store incoming data sent to your station and receive auto forwarded mail from area BBS's. All RAM is now backed with a reliable lithium battery.

The PK-88 is compatible with the TCP/IP protocol and with NET/ROM by Software 2000 for level 3 networking capabilities. The unique host mode of the PK-88 also gives programmers the ability to write special programs. In addition to all the features of a standard TNC, the PK-88 offers features not found in any other TNC such as:

New WHYNOT command explains why some received packets may not be displayed.

New AUDELAY command reduces spurious emissions in slow-switching radios.

New "Packet Dump Suppression" prevents dumping unsent packets on the channel when the link fails.

New CUSTOM command - allows limited customizing of the PK-88 for special applications.

Enhanced MBX command - Permits display of only data fields in I- and UI-frames.

Unique MPROTO command - Suppresses display of non-ASCII packets from nodes.

Unique MFILTER value $80 - Suppresses all control and graphic characters except TAB, CR and LF

Unique DFROM command - Permits "Accept" or "Reject" digipeater operation by callsign.

Unique MBX monitoring command - Allows monitoring without packet headers.

Simplified KISS command - Sets all packet parameters for TCP/IP "NET" code.

Specifications:
- Processor: Zilog Z80 RAM: battery backed, 32K Bytes ROM: 32K Bytes
- Hardware HDLC: Zilog 8530 SCC

Modem:
- Input Sensitivity: 5mV RMS
- Input dynamic range: 5 to 770 mV RMS
- Bypassable via Ext Modem connector for use with external modem
- Hardware watch dog timer - 1 minute timeout
- Demodulator: AMD 7910 world chip
- Modulator: Phase continuous sinewave AFSK generator
- Modulator output level: 5-300 mV RMS adjustable

Rear Panel Input/Output Connections
- Radio Interface: 8 pin; Receive Audio, Transmit Audio, PTT, Auxilliary Squelch, Ground
- Audio In/Out: 3.5mm connector
- External Modem: 5 pins DB-25; Transmit data, Receive data, carrier detect, Clock, Ground
- Terminal Interface: RS-232 25 pin DB25 connector
- Terminal Data Rates: 300, 1200, 2400, 4800, 9600 (with autobaud select)

Front Panel Indicators:
- Indicators: Operational Modes; Converse, Transparent, Command; Send, Data Carrier Detect, Status, Connect, Multiple Connect

Power:
- +12 to +16 VDC @ 550ma, 2.1mm power connector, center positive. AC-1 120 VAC adapter available

Physical:
- 7.5"W x 6"D x 1.5"H, 2lbs.-6oz.

AEA Retail $193.88 **Amateur Net $159.95**

Handheld DX with the DX Handy™

The idea of handheld DX seems far-fetched, but it's actually very simple. The DX Handy is a battery powered (six penlight AA drycells included) SSB/CW transceiver with two watts output. DX Handy can also use nicad rechargeable batteries, or be powered with 9 VDC.

Two variable crystal oscillators (VXOs), each with 50 KHz range, can be selected with a top panel switch. Crystals for 28.250 to 28.300 and 28.300 to 28.350 Mhz are included in the ten meter DX Handy. Crystals for 50.1 to 50.15 and 50.25 to 50.3 are included in the six meter DX Handy. Other crystals are available at a nominal cost.

CW operation can be by either the built-in push button or with an external key or keyer. External speaker and microphone jacks are also provided, and the telescoping antenna is included. The DX Handy also has a top panel S-meter/ output power meter and an effective noise blanker circuit. DX Handy is housed in an attractive gray metal case comparing in size to popular VHF FM handhelds.

With DX Handy all amateurs, novice to extra class, can enjoy the thrill of working handheld DX.

DX Handy Six or Ten

AEA Retail $379.95

Amateur Net $319.95

Specifications

General

- Frequency Coverage: Any 50 KHz segments in the 28.0 to 29.0 MHz Amateur Band for the ten meter version, or an 50 KHZ segments in the 50.1 to 50.3 MHz Amateur Band for the six meter version
- Frequency Control: VXO provides 50 KHz of continuous tuning with a single crystal
- Frequency Stability: Within ±500 Hz from a cold start
- Antenna: 50 Ohms Unbalanced, BNC connector
- Power Requirement: 8.4–9.0 VDC
  (Included): 6-AA Dry Cells (1.5 volt/cell) = 9.0 VDC
  (Optional): 7-AA NiCads (1.2 Volt/cell) = 8.4 VDC
- Current Drain: Receiving - Approx. 70 mA
  Transmitting - Approx. 620 mA
- Dimensions: (W) 66mm × (H) 39mm × (D) 142mm
- Weight: 710 Grams (1 lb. 9 oz.) with batteries and antenna

Transmitter

- Output Power: Ten Meter DX Handy - 2 Watts at 9.0 VDC
  Six Meter DX Handy - 1 Watt at 9.0 VDC
- Emission modes: A3J (USB) and A1 (CW)
- Spurious Emissions: More than 40 dB down

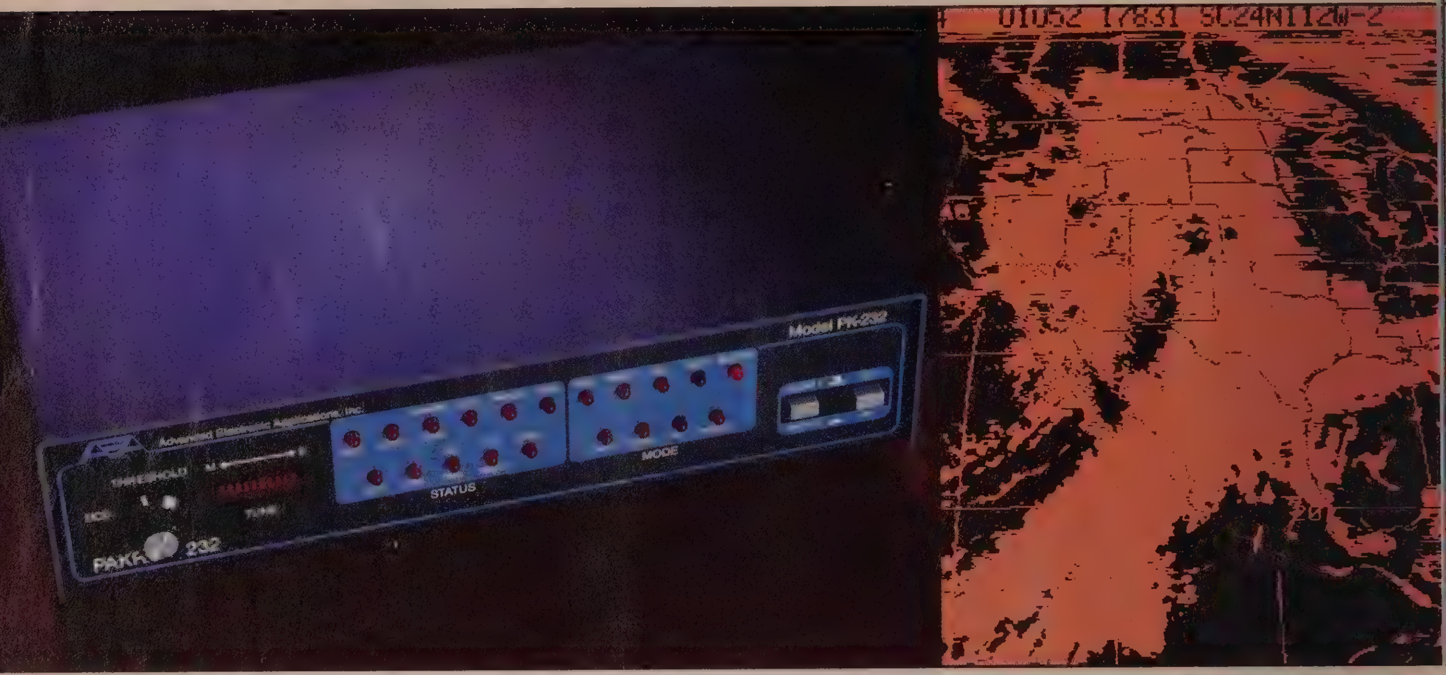
Receiver

- Sensitivity: less than 0.5 uV for 15 dB S/N
- Intermediate Frequency: 11.2735 MHz

Controls and Indicators

- On/Off Volume control: Top mounted Potentiometer
- Receiver Incremental Tuning (RIT): Top mounted Potentiometer with center off detent position
- Frequency: Top mounted 50 KHz VXO
- Frequency Range: Top mounted 2-position switch
- Noise Blanker: Top mounted On/Off switch
- S/RF meter: Top mounted S/RF meter
- Built in CW key: Top mounted momentary switch
- External Speaker output: Top mounted 1⁄16″ phone jack
- External Microphone input: Top mounted 1⁄8″ phone jack
- Antenna Connector: Top mounted Female BNC
- Transmit Indicator: Top mounted Transmit LED
- Push-To-Talk: Side mounted momentary switch
- External Power: Bottom mounted 2.1 mm coaxial
- External key input: Bottom mounted 1⁄8″ phone jack
- Mode Selector Switch: Bottom mounted 2-position switch
- Charge/External Power: Bottom mounted 2-position switch selecting 12 VDC external power function

The Legendary PK-232™ Multimode



The PK-232 is the best amateur multimode data controller you can buy. No other controller offers Morse Code, Baudot, ASCII, AMTOR, Packet, and Facsimile transmission and reception, and the ability to monitor the new Navtex marine weather and navigational system. Only the PK-232 offers seven operational modes in one controller.

The PK-232 makes any RS-232 compatible computer or terminal the complete amateur digital operating position. All decoding, signal processing, and protocol software is on ROM in the PK-232. Only a simple terminal program (like those used with telephone modems) is required to interface the PK-232 with your computer. The PK-232 package includes a special terminal /printer "Y" cable that connects the PK-232 to both the serial RS-232 port of the computer and the parallel printer port for FAX printing.

The real strength of the PK-232 is its superior design. The PK-232 is a Z-80A based system and has hardware HDLC using the Zilog 8530 SCC. The internal modem of the PK-232 can transmit packet at rates from 24 to 1200 baud, with the option of using an external modem for higher baud rates up to 9600 baud (modifiable for 19.2 K baud). The PK-232 also has a no compromise VHF/HF/CW modem with an eight pole bandpass filter followed by a limiter discriminator with automatic threshold correction. The PK-232 modem can copy shifts from 85 to 1500 Hz in two ranges. Transmitter tones are low distortion sinewave phase continuous AFSK, Bell 202 standard (1200-2200 Hz) for VHF, and 2110-2310 (compatible with 170Hz shift for RTTY) for HF.

The PK-232 internal software includes special features like SIAM™ (Signal Identification and Acquisition Mode). This mode lets you tune an unidentified signal and watch the PK-232 decide the incoming signals' mode, baud rate or speed, and configuration. Additional commands even allow you to decode simple types of Baudot encryption. In addition to Baudot, ASCII, and AMTOR, the PK-232 will copy the third register cyrillic alphabet of five level baudot, and Japanese Katakana and Russian Cyrillic Morse code.

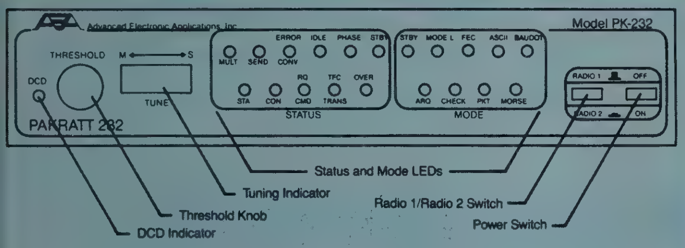
In packet the PK-232 internal program is also compatible with the popular TCP/IP networking protocol. This protocol requires the TNC to feature special commands, (Kiss, Persistence, Slottime) not found in all controllers. The p-persistence method of packet channel access is available in both host and verbose modes.

The Host mode (a kind of computer to computer shorthand) of the PK-232 also allows programmers to write special terminal programs, like PC Pakratt and Com Pakratt, for full featured multimode operation. You can also use the PK-232 with the popular W0RLI and WA7MBL packet bulletin board programs.

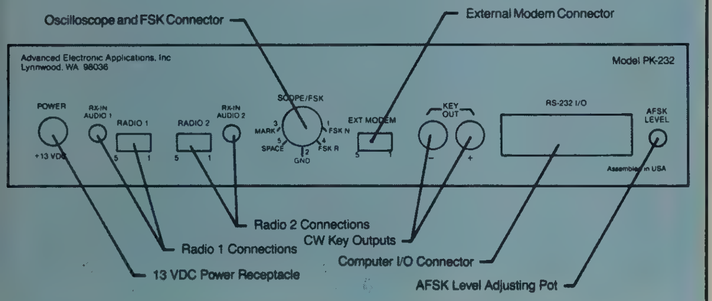
Compare the PK-232 to any other amateur controller. You won't find all these features available at any price.

FAX Printing—Many parallel printers can be connected directly to the PK-232 to print HF monitored FAX signals. The PK-232 supports Epson, IBM, and other popular dot matrix graphics printing standards.

Data Controller



PK-232 Front Panel Controls and Indicators



PK-232 Rear Panel Connections and Controls

Easy Efficient Operation—Twenty-one front panel indicators and a tuning indicator make multimode operation simple by giving mode and status information at a glance.

Comprehensive User's Manual—With a "Quick Start" section to get you on the air fast, the 328 page manual gives you all you need including schematics and parts list. A technical reference manual is also available.

Battery Backed RAM—No need for "perming," all operating parameter values, including beacon and connect message texts, are saved and continually updated.

Adjustable Threshold Control—Front panel continually-variable threshold control permits critical adjustment of effective modem sensitivity and squelches output of "garbage" to screen or printer.

Two Radio Ports—Independent radio connection ports allow interchangeable HF or VHF operation. Front panel push button selectable.

External Modem Disconnect—Internal modem bypass guarantees compatibility with higher speed modems.

External AFSK Level Adjustment—Rear panel control permits easy AFSK level changes for different radios and modes.

Scope and FSK Outputs—A separate accessory port gives both mark and space scope outputs and permits connection to your HF radio's FSK input.

Specifications

Modem
- Input Dynamic Range: 5mv to 500 mvRMS
- Bypassable via Ext Modem connector for use with external modem
- Hardware Watch Dog Timer—1 minute timeout
- Onboard calibration software
- Demodulator: 8 pole bandpass filter, limiter, 4 pole discriminator, 5 pole post-detection low pass filter.
  - VHF Packet: 1700 Hz center frequency, 2600 Hz BW
  - HF (non CW): 2210 Hz center frequency, 450 Hz BW
  - CW: 800 Hz center frequency, 200 Hz BW
- Modulator: Phase continuous sinewave AFSK generator
- Modulator output level: 5-100 mvRMS, rear panel adjustable

Packet Protocol
- AX.25 V2L2 (previous versions supported)

Processor System
- Processor: Zilog Z80
- RAM: battery backed, 16KBytes
- ROM: 32KBytes, 48KBytes max
- Hardware HDLC: Zilog 8530 SCC

Rear Panel Input/Output Connections
- Radio Interfaces: Two 5 pin; front panel selectable (receive audio, transmit audio, PTT, Auxillary squelch, Ground)
- External Modem: 5 pin; Transmit data, Receive data, Carrier detect, Clock, Ground
- FSK Outputs: normal and reverse
- Scope Outputs: Mark, Space
- CW Keying Outputs: +100VDC @ 100 ma max, or −30VDC @ 20 ma max
- Terminal Interface: RS-232-C 25 pin DB25 connector (pins 1-8 and 20 software and hardware handshake)
- Terminal data rates: 300, 1200, 2400, 4800, 9600 baud

Front Panel Controls and Indicators
- Controls: Power, Radio selector, Threshold adjust
- Indicators: Data Carrier Detect LED, 10 Segment HF Bargraph Tuning Indicator, Mode Indicators (Baudot, ASCII, PTT, Morse, Check, FEC, ARQ Mode L, STBY), Status Indicators (STBY, Phase, Idle, ERROR/Conv, Over)

Power Requirements
- +12 to +16 VDC @ 700ma, 2.1 mm connector, center pin positive
- Reverse polarity protection (internal 1 amp fuse)
- Optional AC-4 VAC Adapter available

Physical
- 11″x 8.25″x 2.5″, 3 lbs.

AEA Retail $415.95 **Amateur Net $349.95**

PC Pakratt with Fax

AEA has created two very special IBM PC or compatible computer programs to support the PK-232 multi-mode data controller. These two programs, PC Pakratt and PK Fax, are available on two 5¼ inch disks in a single package called PC Pakratt with Fax.

PC Pakratt

The PC Pakratt program is a split screen terminal program for operation of Morse code, Baudot, ASCII, AMTOR, and Packet. Features include:

Friendly Help Menu - Defines commands and parameters on screen in all modes for easy operation.

Up to 64K byte QSO Buffer - Stores all incoming data for editing and retransmission.

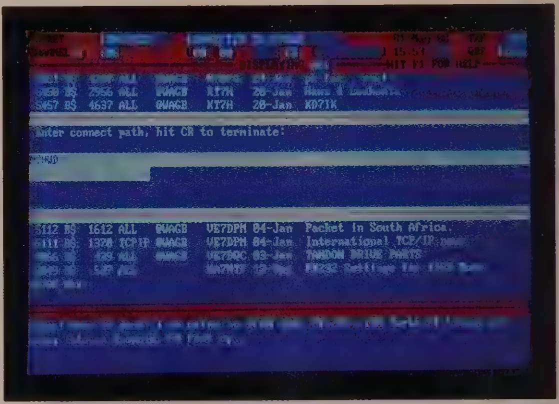
Built in Editor - Simple yet full featured text editor for text file editing.

Color Monitor Compatibility - Select different colors for text, background, and border screen display.

Ten Message/Command Buffers - Pre-program messages or commands for transmission with a single keystroke.

Disk Operation - Supports disk directory, file transfer, and storage of data received.

Parameter Display - Exclusive display of all important parameters on one screen.



```
HIT F1 FOR HELP
5457 BS  4637 ALL   @WAGB   KI7H   20-Jan  KD7IK
Enter connect path, hit CR to terminate:
5112 BS  1612 ALL   @WAGB   VE7DPM 04-Jan  Packet in South Africa.
```

The PC Pakratt program requires 320K RAM minimum and DOS version 2.1 or higher.

PK Fax

The PK Fax program allows screen display, disk storage, and transmission of facsimile signals. Features include:

Facsimile Screen Display - All standard radio facsimile formats can be displayed.

Automatic Disk Storage - Received signals can be stored to either floppy or hard disk automatically.

Paintbrush Compatible - Convert received signal files to Paintbrush compatible format.

Facsimile Transmission - Transmit files, including Paintbrush files, in the fax mode.

Printer Compatible - Print received files with most printers capable of dot matrix graphics.

Screen Zoom - Enlarge any ¼ screen to four times normal size for closer inspection.

PK Fax is compatible with CGA, EGA, and Hercules compatible graphics adapter cards. No hardware or software changes are necessary to any FAX compatible PK-232. PK Fax requires 384K internal computer memory and two disk drives are recommended.

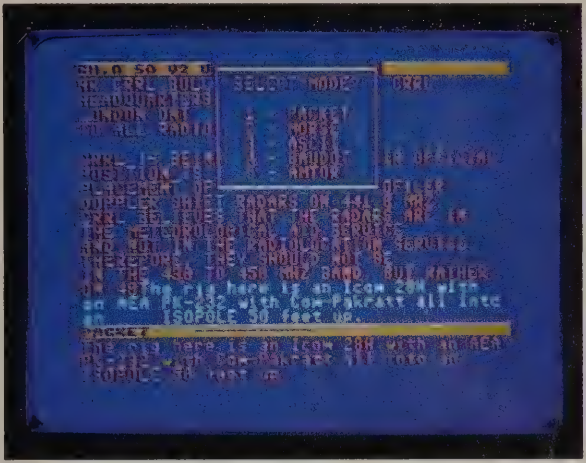
PC Pakratt with Fax **AEA Retail $54.95** **Amateur Net $44.95**

Com Pakratt with Fax

AEA has created two very special Commodore 64 programs to support the PK- 232 multi-mode data controller. These two programs, Com Pakratt and Com Fax, are available on two ROM plug-in cartridges in a single package...Com Pakratt with Fax.

Com Pakratt

The Com Pakratt program is a split screen terminal program for operation of Morse code, Baudot, ASCII, AMTOR, and Packet. Features include:



Function Key Operation - Most common commands are programmed for direct function key operation.

QSO Buffer - Incoming data is automatically routed into a QSO buffer capable of holding up to 13K.

Program on Cartridge - Easy to use ROM cartridge means disk or cassette drive is not needed.

Color Monitor Compatibility - Select background, text, highlight, and echo colors.

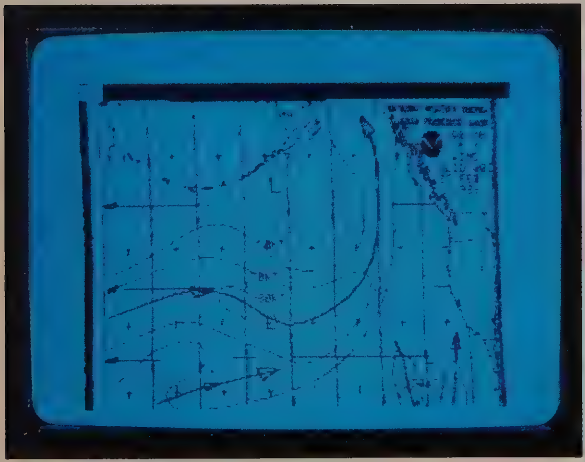
Ten Message/Command Buffers - Six preset and four programmable memories for CQ, QBF, RY, Time, Callsign, and Selcal.

Disk Operation - Supports disk directory, file transfers, and storage of received data.

The Com Pakratt program supports printer output for Morse code, Baudot, ASCII, AMTOR, and packet to Commodore printers directly from the computer.

Com Fax

The Com Fax program allows screen display, disk storage, and transmission of facsimile signals. Features include:



Facsimile Screen Display - All standard radio facsimile formats can be displayed.

Function Key Operation - Most common commands are programmed for direct function key operation.

Printer Compatible - Supports printer output to VIC 1525 or MPS 801 compatible printers.

Screen Zoom - Enlarge any ¼ screen to four times normal size for closer inspection.

Disk Operation - Supports disk directory, load/save fax buffer, and disk commands.

Facsimile Transmission - Transmit files directly from the fax buffer.

Com Pakratt with Fax includes two programs (Com Pakratt and Com Fax) on plug-in ROM cartridges and the RS-232 to TTL hardware interface. No hardware or software changes are necessary to any FAX compatible PK-232.

Com Pakratt with Fax AEA Retail $84.95 **Amateur Net $74.95**

Improve VHF/UHF Performance with the IsoPole™ Antennas

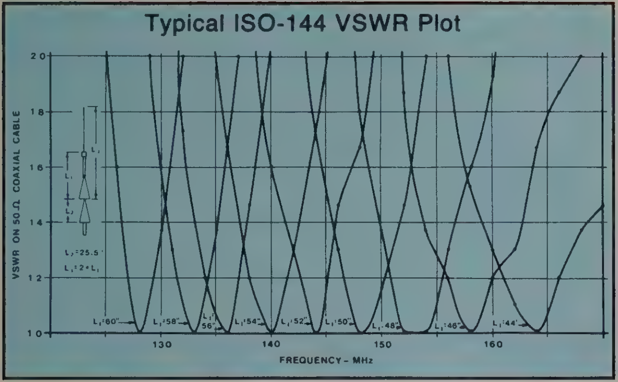
Outstanding mechanical and electrical design makes the IsoPole the only logical choice for a VHF base station antenna. All IsoPole antennas yield the maximum gain attainable for their respective lengths and a zero degree angle of radiation. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Cones offer great efficiency over obsolete radials which radiate in the horizontal plane and present an unsightly birds roost with an inevitable "fallout zone" below. The IsoPoles have the broadest frequency coverage of any comparable VHF base station antenna. This means no loss of power output from one end of the band to the other, when used with SWR-protected solid state transceivers. Typical SWR is 1.4 to 1 or better across the entire band!

For VHF versions, a standard 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole, you will not experience the aggravating deviation in SWR with changes in weather. The impedance matching network is designed for maximum legal power and even compensates for the impedance lump introduced by the SO-239 connector used in VHF models.

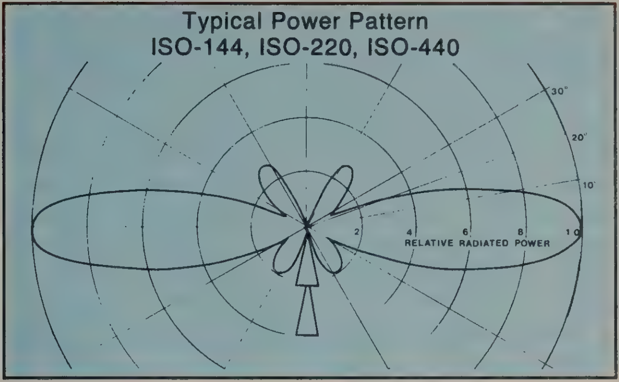
The insulating material offers superb strength and dielectric properties plus excellent long-term ultra-violet resistance. All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion resistant aluminum alloys. The aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast which is not supplied).

Isopole 144 & 220
AEA Retail $69.95
Amateur Net $59.95

Isopole 440
AEA Retail $104.95
Amateur Net $89.95



Typical ISO-144 VSWR Plot



Typical Power Pattern
ISO-144, ISO-220, ISO-440

Specifications

MODEL	144	220	440
Freq. Coverage (Mhz)	135-160	210-230	415-465
Impedance	50 Ohm	50 Ohm	50 Ohm
2.1 VSWR bandwidth	>10Mhz @ 146Mhz	>15Mhz @ 220Mhz	>22Mhz @ 435Mhz
Power rating	1 kw	1 kw	1 kw
Radiating Element Length	125.5″ (3.2m)	79.25″ (2m)	46″ (1.2m)
Wind Area	<1 sq. ft.	<.75 sq. ft.	<.20 sq. ft.
Maximum Mast OD	1¼″ (32mm)	1¼″ (32mm)	1¼″ (32mm)
Minimum Mast Length**	8 ft. (2.4m)	5½ ft. (1.6m)	6″ (150mm)
Shipping Weight	5 lbs.	4 lbs.	2.5 lbs.
Coax Connector	PL-259	PL-259	Type N
*dbd—db gain over a dipole in free space **Mast not included			

Our Customers Say It Best . . .

The Isopole design is tried and true. For over eight years AEA has been selling this unique antenna to amateurs around the world. The reports we get from our customers tell the story.

I have had a two meter Isopole in service for three or four years now. Love it.
I. H. Princeton WV

Isopole can't be beat for ease of construction. Its performance is superb. I have a friend who says the Isopole ourperforms his eleven element beam. *G. S. Greensboro NC*

Good reports, superior performance. Recommended by several hams as best on market regardless of price. *D .W. Panama City FL*

Had an Isopole in Hawaii. Stood up to corrosion well. *R. S. Union City CA*

I had an Isopole before and went to a beam. The Isopole is a better all around antenna.
S. K. Russels Point OH

I like the straightforward instructions and simple design of the Isopole.
D. G. Sterling Heights MI

Many ham friends highly recommend it. Glad I listened to my friends. Very happy with the Isopole. *W. M. Louisville KY*

AEA HOT ROD™

High Performance Hand-Held Antenna

The Hot Rod antenna makes the same improvement to hand-held comunications that the IsoPole antennas have made to base station operation. Achieve higher gain over ANY 5/8 wave two meter telescopic antenna. The factory tuned HR-1 is 20% shorter, lighter and places far less stress on your hand-held connector and case. It will easily handle over 25 watts of power, making it an excellent emergency base or mobile antenna. In the collapsed position, the Hot Rod antenna will perform like a helical quarter wave. Three Hot Rods are availabale: HR-1 1/2 wave 2M antenna, HR-2 for 220 MHz. and HR-4 for 440 MHz. The HR-4 is a flexible 1/2 wave "duck" antenna that is 16 inches long.

AEA Retail $24.95

Amateur Net $19.95

MU-64 Morse University™

Makes Learning Morse Code Easy and Fun

The Morse University program and a Commodore 64 computer can make learning Morse code easier that you ever thought. With the Learning Routine you'll learn the individual characters and numbers. The Proficiency Routine helps you increase your speed by generating random characters in groups. The Sending Anlaysis lets you check your fist by graphically displaying the characters you send using the keyboard function keys. You can even use your new skills to play the Receiving Game. A video game that shoots the antenna off your house with lightning bolts if you don't type in the characters sent.

The Morse University program is a ROM cartridge that plugs directly into the computer and does not require a disk drive. Morse University is compatible with the Commodore 64, 128, and 64-C.

AEA Retail $49.95 **Amateur Net $39.95**

AC-1 Power Adapter

The AC-1 nominal 12 VDC wall adapter is a suitable power supply for all AEA products requiring 12 VDC at 600 ma or less current. The AC-1 comes with a six foot power cord and a standard 2.1 mm (center pin positive) coaxial power plug that mates with all AEA products. The AC-1 can also be used for any load requiring filtered, but unregulated nominal 12 VDC at 600 ma or less.

Amateur Net $15.95

AEA Retail $20.95

AC-1

AC-4

AC-4 Power Adapter

Same as AC-1 except 1 amp output.

Amateur Net $28.95

AEA Retail $33.95

DC-1 Cigarette Lighter Cord

The DC-1 is a fused cable with a standard cigarette lighter plug on one end and a 2.1 mm (center pin positive) coaxial cable plug on the other end.

Amateur Net $6.95

AEA Retail $7.95

DC-1

Digital Communications with Amateur Radio Book. **Amateur Net $10.95** **AEA Retail $15.00**

PK-232 Technical Reference Manual. **Amateur Net $25.00** **AEA Retail $30.00**

Authorized Dealers — Ordering Information

AEA is represented by the finest amateur radio dealers . These dealers offer the best prices on AEA products. The AEA Retail price is the cost for ordering the product direct from the factory. Washington residents add 7.8% sales tax. Factory direct orders also require $5.00 shipping and handling for U.S. orders, foreign orders please send inquiry for shipping and handling costs. The Amateur Net price is the advertised price for purchase through most of our Authorized Dealers.

Please contact one of the dealers listed below to purchase AEA products.

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Phoenix, 602/242-3515

Pace Engineering
Tuscon, 602/888-3333

CALIFORNIA

Ham Radio Outlet
Anaheim, 714/761-3033
800/854-6046

Ham Radio Outlet
Burlingame, 415/342-5757

Ham Radio Outlet
Oakland, 415/451-5757

Ham Radio Outlet
San Diego, 619/560-4900

Ham Radio Outlet
Van Nuys, 818/988-2212

Henry Radio
Los Angeles, 800/421-6631
213/820-1234

Jun's Electronics
Culver City, 213/390-8003
800/882-1343

Quement Electronics
San Jose, 408/998-5900

COLORADO

C.W. Electronics
Denver, 303/832-1111

Colorado Radio Center
Denver, 303/288-7373
800/227-7373

DELAWARE

Delaware Amateur Supply
New Castle, 302/328-7728
800/441-7008

FLORIDA

Amateur Electronic Supply
Clearwater, 813/461-4267

Amateur Electronic Supply
Orlando, 305/894-3238
800/327-1917

Eli's Amateur Radio Inc.
Ft. Lauderdale, 305/525-0103

Mike's Elec. Dist. Co.
Ft. Lauderdale, 305/491-7110

Quad Elec.
Pensacola, 904/438-3319

International Radio Systems
Miami, 305/594-4313

GEORGIA

Doc's Communications
Rossville, 404/866-2302

Ham Radio Outlet
Atlanta, 404/263-0700

HAWAII

Honolulu Elec.
Honolulu, 808/949-5564

IDAHO

Ross Distributing Co.
Preston, 208/852-0830

ILLINOIS

Erickson Communications
Chicago, 800/621-5802
312/631-5181

Floyd Electronics
Collinsville, 618/345-6448
INDIANA

Ham Station (The)
Evansville, 812/422-0231
800/523-7731

KANSAS

Amateur Radio Equipment Co.
Wichita, 316/264-9166

MARYLAND

Maryland Radio Center, Inc.
Laurel, 301/725-1212

MASSACHUSETTS

Tel-Com Inc.
Littleton, 617/486-3400

MICHIGAN

Den-Tronics
Flushing, 313/659-1776
800-PACKITT

Michigan Radio
E. Detroit, 313/771-4711

MISSISSIPPI

Hooper Electronic Supply
Biloxi, 601/432-0584

MISSOURI

Missouri Radio Center, Inc.
Kansas City, 816/741-8118
800/821-7323

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Ham Radio Outlet
Salem 603/898-3750
800/444-0047

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Derry, 603/434-5371

NEW JERSEY

KJI Electronics
Cedar Grove, 201/239-4389

NEVADA

Amateur Electronic Supply
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702/647-3114

Reno Radio
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800/345-5686

NEW YORK

Barry Electronics
New York, 212/925-7000

VHF Communications
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Electronic Specialist
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Williams Radio Sales
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Hamtronics
Trevose, 215/357-1400

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Scranton, 717/343-2124

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Watertown, 605/886-7314

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800/423-2604

Electronic Center, Inc.
Dallas, 214/526-2023

K-Comm Inc.
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713/520-7300

Mission Consulting
Houston, 713/879-7764

Texas Comm Center
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Texas Towers
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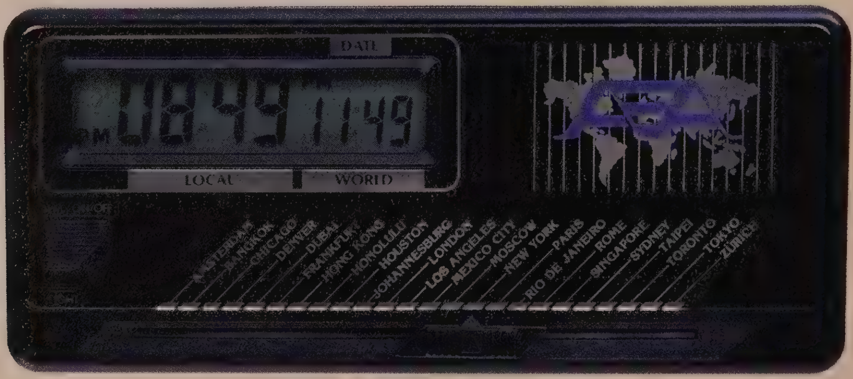
Com-Wes Radio System Ltd.
Vancouver BC 604/321-1833

Advanced Electronic Applications, Inc.
P.O. Box C-2160 Lynnwood, WA 98036
206-775-7373

AEA World Clock

Amateur radio can take you around the world, and the new AEA World Clock lets you know the proper time when you get there. With dual digital displays you see local time and any of 24 selected time zones side by side. The slide bar on the bottom of the clock can be moved to the city/zone you want, and the display automatically changes to the proper time for that time zone. The AEA World Clock is perfect for use in the station and for travel. A folding easel stand positions the clock for desktop use, and a leather-like travel pouch is also included.



24 Hour Display-Both displays show 24 hour time.
Lighted Display-Light button for night viewing.
Daylight Savings Switch-Shows Standard/Daylight Savings conversion.
Batteries Included-Two AAA batteries installed.
Date Line Indication-Display shows +/- for international day change
Compact Size-2" x 4.5" x .5"
Alarm with delay-Six minute snooze feature included with alarm.

AEA Retail $24.95 **Amateur Net $19.95**

All AEA products carry a 90 day warranty on parts and labor. Specifications and prices subject to change without notice or obligation.
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Catalog #389

AEASOFT^{tm} SOFTWARE

MBATEXT^{tm}

MORSE, BAUDOT, ASCII SOFTWARE

FOR

AEA COMPUTER PATCH (CP-1)

AND THE

COMMODORE 64 COMPUTER

Model No. CP-1/COMM64-1

P. O. Box C2160, Lynnwood, WA 98036-0918
(206) 775-7373 Telex: 152571 AEA INTL

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040-924

OVERVIEW

This software package contains the software in EPROM on a PC board, this manual, keyboard overlays, and a connecting cable to connect the CP-1 and your Commodore 64 computer. The program will run on a minimum-sized Commodore 64. It can make use of cassette or disk I/O and you may wish to add that hardware - however it isn't needed to use most of the program.

You should locate, fill out and return the enclosed Software Support Agreement and record the support number off it on the similar page at the end of this manual.

This software allows you to send and receive Morse or RTTY (in ASCII or Baudot). It features type ahead buffering, multispeed operation, split screen, precompose operation, text editing, word wrap, a time of day clock, diddle, printer output, dump to or retreive from cassette or disk, USOS, receive (QSO) buffer on-off, auto CR/LF, CW break-in operation, word or character mode on transmit, audio feedback from the keyboard, Morse code idle character, 10 message buffers all with adjustable sizes, Xmit buffer with adjustable size, dedicated function keys for quick operation, transmit and receive speed change capability with speed guess capability, Farnsworth Morse operation below 15 wpm, retransmission of received text without cassette or disk save, CW speed lock, transmission of files from cassette or disk, and the ability to imbed control functions in text to be transmitted.

IN CASE OF TROUBLE

Application and troubleshooting assistance may be had by calling AEA during our 8-12 and 1-4:30 working hours in Seattle, WA. and asking for the Service Department. Telephone 206-775-7373. Please have your software support number and the version number of your software ready. The first you have recorded on the Support Agreement at the end of your manual, the second is available from the screen after system boot. This manual is written for version 1.1.

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INSTALLATION

Make sure the power is off to the computer and the CP-1. Make sure the board edge contacts are clean. You may want to clean them with an eraser first. Avoid touching the contacts with your fingers or anything else that may static-discharge to them as the EPROM can be damaged. Install the program cartridge in the Commodore 64 Cartridge Slot on the right rear surface of the computer. Plug the board in with its component side facing up. Make sure the board is fully seated. Plug the cable into the User Port on the left end of the Commodore 64 and the other end into the TTL connector on the rear of the CP-1. MAKE SURE THE CABLE EXITS DOWNWARDS FROM THE TTL CONNECTOR. Connect the CP-1 to your radio as described in the CP-1 manual. (Note: you may wish to leave the PTT and AFSK output from the CP-1 disconnected while you familiarize yourself with the program's operation - in this fashion you won't go on the air with your practicing). Turn on the CP-1, your radio and the Commodore 64. Read the next section and proceed to the STARTING THE PROGRAM section.

THE PROGRAM

The AEASoft MBAText Communications Package sets up a communications system using the Commodore 64 computer. The communication modes offered are Morse Code, RTTY (Baudot), and ASCII.

The buffers used by the program are:

XMIT Buffer - The buffer that holds the characters to be transmitted. This buffer has a fixed size at all times, initially 256 characters, which can be changed in the Command Menu (see below). "XBF" stands for the number of characters free in the XMIT Buffer -- this decreases when characters are entered into the buffer and increases when they are transmitted. If you reach the limit, you simply will not be able to type anymore into the buffer until some has been transmitted, thereby making more room.

10 MESSAGE Buffers - These are 10 Soft Partitioned^{tm} buffers that can hold information such as brag tapes, contest exchanges, or bulletins -- anything that might need to be transmitted several times. They can be loaded or saved on cassette or disk under the Command Menu.

QSO Buffer - This buffer holds all characters received and transmitted in the Morse, RTTY, or ASCII modes. Its length is variable, and the number of characters free is signified by "QBF". When QBF becomes 0, the earliest characters in the buffer are lost and the newest ones take their place. QSO recording is an option -- if no recording is desired then this buffer stays empty. The QSO Buffer can be edited, printed, and loaded or saved on cassette or disk.

STARTING THE PROGRAM

After all the cables and the circuit board have been installed, turn on the Commodore 64. It should say "READY". If you are using a color TV as the display, type this:

```
SYS 33330
```

followed by RETURN.

If you are using a monochrome monitor (CRT) as a display, type this:

```
SYS 33333
```

followed by RETURN.
Now the screen should show this:

```
                         00:00:00

MBA TEXT TM    V1.1
COPYRIGHT 1983 BY AEA

SELECT:

  M.   MORSE
  A.   ASCII
  R.   RTTY
  C.   COMMAND MENU
  O.   OPTIONS
  B.   BACK TO BASIC
```

You are given the choice of the 3 modes of operation (Morse code, ? ? 8-bit ASCII, or 5-bit Baudot RTTY), a command menu, an options menu, or return to the BASIC language of the Commodore 64.

To select one of the choices, press the key indicated: M, A, R, C, O, or CTRL-B. Each selection is discussed below. To get back to this menu, type "RUN/STOP".

BACK TO BASIC

The "B" in the Back to BASIC selection is in reverse video as a reminder that the CTRL key must be held down while you are pressing the "B" key. This is to ensure that you really mean to return to BASIC, which would destroy any information in the data buffers of the MBAText program.

OPTIONS MENU

The Options Menu looks like this:

```
     U.   USOS                ON
     M.   MORSE FILL (BT)     OFF
     R.   RTTY SYNC (NUL)     OFF
     A.   AUDIO FEEDBACK      OFF
     C.   AUTO CR             ON
     L.   AUTO LF             ON
     W.   WRAP-AROUND         ON
     B.   CW BREAK-IN         OFF
     O.   OUTPUT MODE         CHAR
```

3.

To change the state of an option, press the indicated key and the option will be displayed as opposite to what it was before the key was pressed. Press RUN/STOP to get back to the Main Menu.

U. UNSHIFT ON SPACE - USOS causes RTTY reception to go to the LETTERS mode after a space is received. At times a received LTRS character can be garbled or another character can be wrongly interpreted as a FIGS character, and many perfectly good characters received after this would be interpreted as being Figures rather than Letters. USOS helps reception in this case. However, some non-amateur services send groups of numbers separated by spaces, in which case USOS would not be helpful.

M. MORSE FILL (BT) - The Morse Code idle character is the double dash (BT sent as one character). If you are transmitting Morse and you cannot think of what to say next, this option will fill in the dead air with BTs.

R. RTTY SYNC (NUL) - The RTTY idle character is NULL. This option causes NULLS to be sent in the absence of characters being typed into the XMIT buffer.

A. AUDIO FEEDBACK - Makes a short beep noise on the TV speaker when a key is pressed. If you are using a video monitor without speaker, you will hear no tone.

C. AUTOMATIC CARRIAGE RETURN - When transmitting RTTY (Baudot) or ASCII characters, this option causes a carriage return to be sent at the first space after 65 characters, or after 71 characters. When the carriage return is sent, the character count starts at 0 again. This option should not be used if you are sending RTTY pictures, where you want everything sent exactly as typed.

L. AUTOMATIC LINE FEED - This option causes a Line Feed character to be sent after every Carriage Return. In Morse reception, this option causes the printer to receive a line feed after every carriage return. Turn this option off if your printer is doube-spacing (like the VIC-1525 printer).

W. WRAP-AROUND - This option prevents words from breaking up on the display between lines. A new line is started if there is a space in the last 5 positions on a line.

B. CW BREAK-IN - For fast exchanges in Morse, the need to keep pressing the Transmit and Receive keys can be annoying. This option causes the program to go into Transmit mode as soon as a character is entered into the XMIT Buffer. Then you can type ahead as many characters as you wish, editing them if you have time. When the XMIT Buffer becomes empty (after everything has been transmitted), the program automatically goes back to Receive mode.

O. OUTPUT MODE - In CHAR mode each character will be transmitted as it is encountered in the XMIT Buffer. In WORD mode the program will wait at the beginning of a word. When a space or other delimiter is typed, the word is transmitted. This gives you the opportunity to correct your spelling or change the word before it is transmitted (even though the transmit buffer has been emptied).

COMMAND MENU

The Command Menu looks like this:

L. LOAD
E. EDIT
9. MOVE QSO TO MSG 9
S. SAVE
X. SET XMIT BUFF SIZE
T. SET TIME

Again, press the indicated key for the desired function.

L. LOAD

This command loads data from cassette or disk to the message buffers or the QSO buffer. First you will be asked to choose:

Q. QSO BUFFER

M. MESSAGE BUFFERS

2 If "M" is typed then all 10 message buffers will be loaded from disk or cassette at once. In any case, the previous contents of the chosen buffer will be written over.

Next you will be asked to "ENTER FILE NAME". For cassette files, the name should always start with "C:"; for disk files, "D:". For example, the file named BULLETIN on cassette would be entered as "C:BULLETIN" followed by a RETURN. You will be asked to "PRESS PLAY ON TAPE", then you will see "SEARCHING FOR BULLETIN" and then "FOUND BULLETIN". Then the Command Menu will be displayed again. Press RUN/STOP to get back to the Main Menu.

NOTE: The Commodore 64 has several steps in the cassette operation in which it waits for you to press the Commodore key before it continues. When you see the Commands Menu appear on the screen again, the operation is finished.

E. EDIT

This command gives you the ability to read and fix up characters in the message buffers or the QSO Buffer. It is also used when initially entering data into the message buffers. You will first be asked which buffer to edit:

Q. QSO BUFFER

0. MSG 0
1. MSG 1
2. MSG 2
3. MSG 3
4. MSG 4
5. MSG 5
6. MSG 6
7. MSG 7
8. MSG 8
9. MSG 9

Pick one. Editing one buffer leaves all the others unaffected. What you see next is a line at the top of the screen showing which buffer you are editing, the current QSO Buffer space available, and the time, followed by the text already in the selected buffer, if any. Any characters you add or delete will affect the QBF. The current cursor is shown by the blinking character, and the end of the buffer is shown by a distinctive character. The beginning of the buffer will be the first character displayed, while the end of the buffer may or may not be visible on the screen, depending on the buffer size. Any characters typed after the end of the buffer will be tacked onto the end. Here are some other ways to control editing:

Cursor keys - You can go up, down, left or right, one character at a time without affecting the characters the cursor passes over. The cursor keys repeat as they are held down. As you reach the top or bottom of the display, the text will scroll up or down as appropriate.

HOME - Brings cursor to the first character in the buffer.

CLR - Clears all characters from the cursor to the end of the buffer. The End-of-Buffer marker is now under the cursor.

DEL - Deletes the character (blinking) under the cursor.

INST - Toggles INSERT mode. The letters "INS" turn on and off in the top line of the display. If "INS" is displayed, then the next character typed will appear under the cursor, and the cursor character and all following characters move one position to the right.

Lower Case - In ASCII, lower case letters may be desired. Holding down SHIFT while pressing the Commodore key toggles the editor between upper and lower case.

RUN/STOP - Stores the edited buffer and gets you back to the Command Menu.

9. MOVE QSO BUFFER TO MESSAGE 9

This command enables you to re-transmit anything you may have copied into the QSO Buffer. The contents of the QSO Buffer are moved to Message 9, destroying any previous contents of Message 9, and clearing the QSO Buffer. The text can now be transmitted by typing CTRL-9 into the XMIT Buffer in the Morse, RTTY, or ASCII modes. One use for this would be re-transmitting bulletins or message traffic. The text can be edited either before or after the MOVE, using the EDIT command. Editing is necessary for any characters displayed in reverse video; for example, Carriage Return (reverse "M") could be deleted, or a Morse End of Transmission (reverse "AR") would have to be changed into a "*".

The "9" command cannot be used to clear Message 9 by moving an empty QSO buffer to Message 9. The only way to clear it is to Edit Message 9 and use the CLEAR key.

S. SAVE

The contents of the QSO Buffer or the 10 Message Buffers can be saved on cassette or disk. In addition, the QSO Buffer can be printed with this command.

You will be asked to save either "Q" or "M" as in the Load command. Then you will be asked for a file name, again as in the Load command. If you are saving the QSO Buffer, you can type "P:" instead of a file name to send the contents of the QSO Buffer to the printer. When saving on cassette, write down the tape location reading for easy access some other time.

NOTE: When saving to cassette, the Commodore 64 waits for you to press the Commodore key before going on at several points. The Commands Menu appears on the screen again when the Save process is finished.

Pressing "RUN/STOP" at any time will stop the save command and return you to the Command Menu.

X. SET XMIT BUFFER SIZE

This command changes the size of the XMIT (Transmit) Buffer from the initial setting of 256 characters. Type in the size you want followed by a RETURN. If the size required would destroy some of the Message Buffers or the QSO Buffer, you will get only the largest safe amount of storage. If you want more than this, you should edit or clear some of the buffers to make room.

T. SET TIME

Type in 6 digits that reflect the 24-hour time you want.

OPERATION ON THE AIR

RECEIVE MODE

When first entering one of the communication modes, the upper part of the screen becomes a status panel. The 3 modes (Morse, RTTY, and ASCII) are similar in their displays, so the example shown will be Morse:

```
MORSE           00:00:00
XMIT SP  20  XBF     256
RCVE SP  20  QBF   30453
------------------------
```

The mode, Morse, is shown in the upper left-hand corner, and the time is at the right. The Transmit speed is shown as 20 wpm, as is the Receive speed. XMIT Buffer space free is 256 characters and QSO Buffer space free is 30453. The characters "RCVE" are in reverse video to show that we are in Receive Mode.

TRANSMIT MODE

In Transmit Mode the characters "XMIT" are now in reverse video and "RCVE" is displayed normally. In addition, lines have appeared on the screen, dividing it into 3 areas.

The top area shows 13 lines of Received characters as they appear in the QSO Buffer. Transmitted characters, although stored in the QSO Buffer, are not shown here.

The middle area consists of a single line that shows the 40 most recent characters that have been transmitted.

The bottom area consists of 5 lines of text showing the most recent characters entered into the XMIT Buffer. As more characters are typed into the buffer, the 5-line display will scroll up a line at a time. "XBF" will decrease with every character that is typed, and will increase with every character that is transmitted.

FUNCTION KEY DEFINITIONS

The on-the-air operation is controlled by the keys marked "f1" through "f8" on the right side of the Commodore 64 keyboard. Keys f1, f3, f5, and f7 are pressed normally, while f2, f4, f6, and f8 are operated by holding down SHIFT while pressing the intended key. CTRL-f1 and CTRL-f3 mean hold down the CTRL key while pressing the function key.

f1 (Receive) - Gets the program into Receive mode. Every time this is pressed a Carriage Return and a Line Feed character goes into the QSO Buffer and the printer if either is enabled. Text can be typed into the XMIT Buffer while receiving, but it will not be sent until the Transmit key is pressed.

f2 (Clear QSO Buffer) - Empties out the QSO Buffer, returning it to its empty QBF setting.

f3 (Transmit) - Puts the program into Transmit mode. Transmits text previously entered into the XMIT Buffer.

f4 (Clear XMIT Buffer) - Empties out the XMIT Buffer, returning it to its empty XBF setting.

f5 (Change speed) - In Morse mode, you will be asked to "ENTER 2 DIGITS". This becomes the new Transmit speed,, and is shown in the Status Panel. The minimum speed is 5 wpm. For speeds from 5 to 14 wpm, the code is sent with Farnsworth spacing -- that is, the characters are sent at 15 wpm while the spaces between characters are lengthened to yield an overall rate of 5-14 wpm.

In RTTY mode, pressing this key cycles through all speed options: 60, 67, 75, 100, or 132 wpm. Whichever one you stop on becomes the new Transmit and Receive speed. In ASCII mode, this key toggles between 110 and 300 baud speeds.

f6 (Invert) - This key reverses Mark and Space during RTTY/ASCII reception. When Invert is active the letter "I" appears in the first line of the Status Panel. RTTY/ASCII transmission is not affected.

f7 (Speed Lock/Guess) - In Morse mode, this key locks the received speed. The letter "L" appears after the Receive Speed in the Status Panel. Reception of Morse Code in the presence of noise can be enhanced this way. To unlock the speed, press f7 again.

In RTTY/ASCII mode, it is often difficult to tell the speed of a station we hear. Pressing this key causes the program to take a guess at the speed. The estimate will appear in the "RCVE SP" portion of the Status Panel in words per minute for RTTY, and in baud for ASCII. One way to use this key is to hold it down, allowing it to repeat; then watch the estimates and note the value that most of the estimates seem to be near. Note that characters are not received properly. This is because the program is concentrating all its attention on the speed estimate. The transmit speed is not affected by the estimate, and should be changed if necessary using the f5 key.

f8 (Toggle Printer) - This key toggles the printer on and off. When on, the printer prints characters as they are stored in the QSO Buffer. The letter "P" appears on the first line of the

Status Panel. The QSO buffer must be recording characters in order for this feature to operate (see below).

CTRL-f1 (Toggle Recording) - This key toggles the QSO Buffer recording mode. Recording is normally off. When this key is pressed, the Status Panel shows a "*" next to the QBF display ("*QBF") to signify that the QSO Buffer is recording. Pressing CTL-f1 again turns off recording and makes the "*" go away.

NOTE: Be careful to record only what you really need. It is possible to record more than 30,000 characters, and the commands in the Edit Mode respond more slowly the more characters have been recorded. You may want to set the XMIT buffer size to much more than 256 (say 25,000) to keep the QSO Buffer from getting bogged down with too many characters to edit quickly.

CTRL-f3 (Break-in Buffer) - Pressing this key puts you in Transmit mode with a 95-character break-in buffer. This bypasses the XMIT Buffer for short immediate or break-in transmissions. The contents of the other buffers in the system are not affected.

CONTROL COMMANDS

By holding the CTRL key down while pressing certain keys, commands can be imbedded in the XMIT Buffer:

CTRL-(0-9) - Transmit a message port. This can be either the contents of the message port alone or in the middle of text in the XMIT Buffer. A contest on CW might be handled by using the CW Break-In option and storing contest exchanges in the message ports.

CTRL-E - Return to Receive mode. This saves you the trouble of pressing f1 at the end of your transmission.

CTRL-F - Transmit a file from cassette or disk. This sign should be used both immediately before and after a file name. For example, a disk file named TRAFFIC would be imbedded in the transmitted data as follows:

    text (CTRL-F) D:TRAFFIC(CTRL-F) more text.

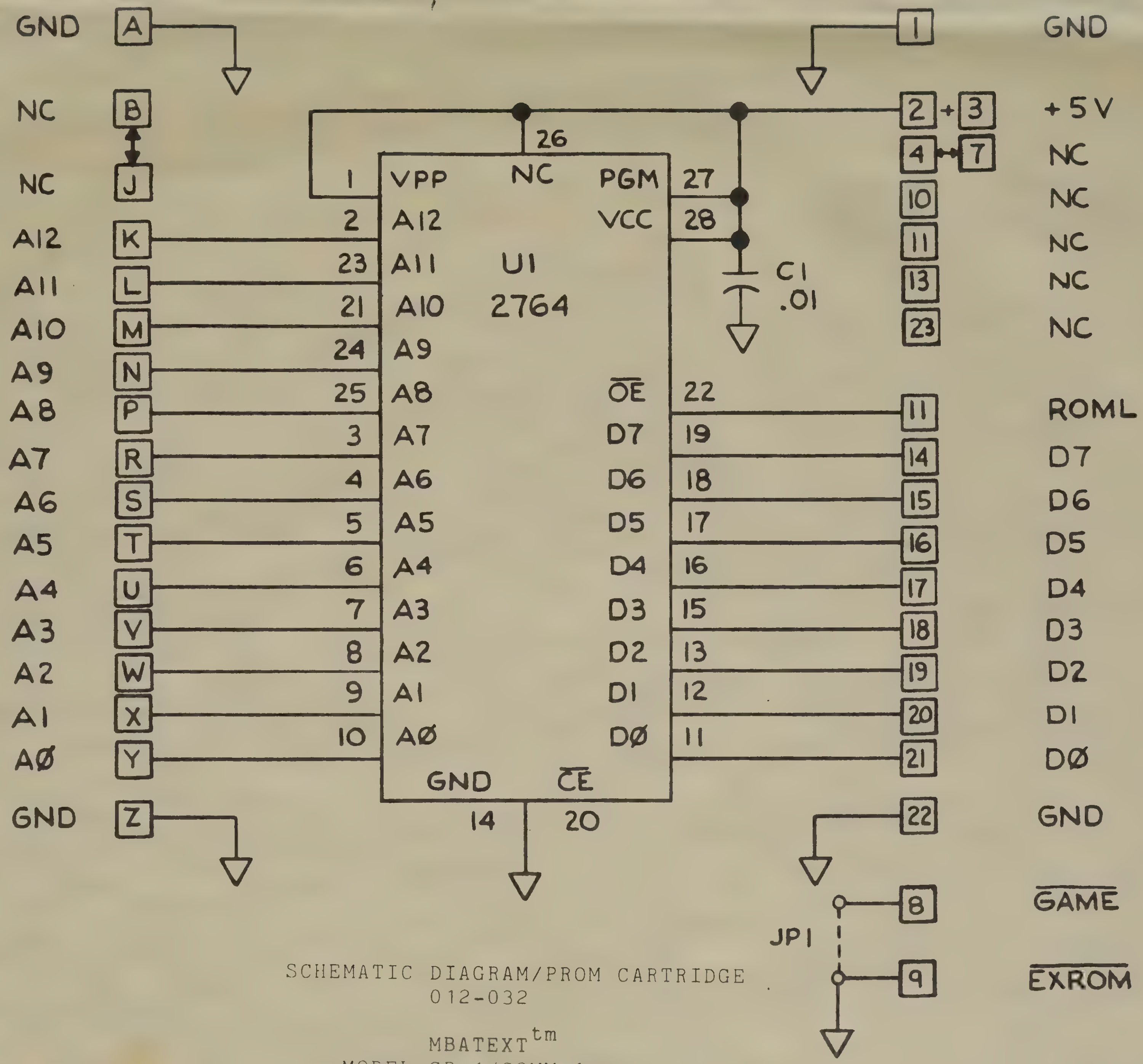
CTRL-T - Time. The current hours and minutes as shown in the Status Panel are sent as 4 digits, without colons.

CTRL-M - Carriage Return. Same as RETURN.

CTRL-J - Line Feed.

SPECIAL MORSE CHARACTERS

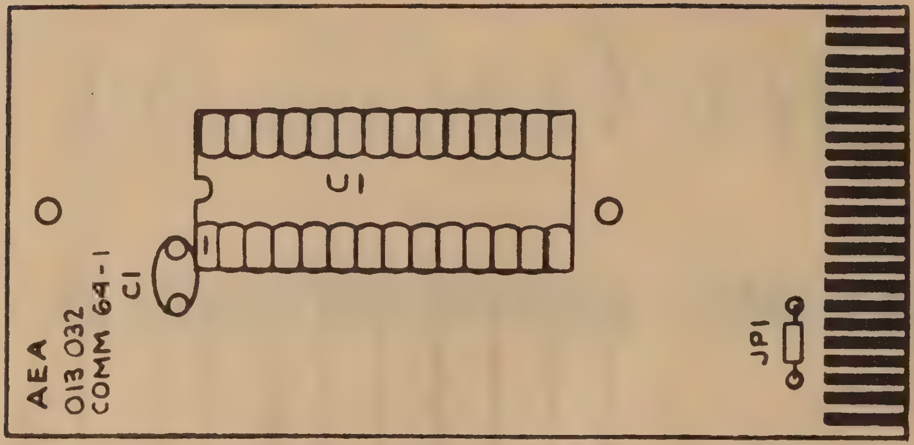
Key	Abbreviation	Meaning
+	SK	End of QSO
@	AS	Wait
*	AR	End of message
Uparrow	KN	Go only
=	BT	Break or pause
Poundsign	AA	New line
!	SN	Understand
%	KA	Attention



SCHEMATIC DIAGRAM/PROM CARTRIDGE
012-032

MBATEXT^{tm}
MODEL CP-1/COMM-64-1

PARTS PICTORIAL



PARTS LIST

REFERENCE	AEA P/N	VALUE/DESCRIPTION
C1	121-103	Ceramic capicitor .01
U1	332-765	I.C. Programmed Eprom 2764
JP-1	779-005	Jumper .05
Socket	400-028	28 Pin
PCB	013-032	
Case	053-025	COMM 64 S/W Top and Bottom
Cable	769-012	CP-1/COMM 64

CABLE CONNECTIONS

Connector to COMM 64 User Port Pin No.		Connector to CP-1 TTL Pin No.	
E	GRN	1	RX SEND
F	WHT	2	RTTY INPUT
H	BLK	3	CW KEY IN
J	RED	5	DEMOD OUT
1,12,A,N	SHIELD	4	GROUND

OPERATING MANUAL
HamLink

Model HL-60

Advanced Electronic Applications, Inc.

OPERATING MANUAL
HamLink

Model HL-60

Advanced Electronic Applications, Inc.

Manual Revision M

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040-072

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HamLink

1.1 WELCOME

Congratulations! You have purchased another fine AEA product. **PLEASE**, before we go any further, may we ask you to fill out and return the *Warranty Registration Card*, that has been packed with your HL-60.

1.2 PRODUCT UPDATE POLICY

From time to time AEA may make available updates to the design or software of its products. We can only tell you about these updates if we have your warranty card on file. Please send in your warranty card.

1.3 OVERVIEW

The HL-60 was designed by AEA to provide the Amateur Radio operator with the ability to control their HF, VHF, UHF station or receiver over a telephone line. The basic requirement your transceiver or receiver must have is the ability to be controlled by a computer. You must also have a true Touch Tone (Touch Tone is a trademark of AT&T) telephone to control HamLink. A computer is not required for use with HamLink.

1.3.1 CAPABILITIES

The HL-60 allows you to control the frequency, mode, VFO selection, scan, and split operation, of your radio. It also will announce the frequency the radio is tuned to in a synthesized voice.

There are two methods of tuning the radio. The operator can key in a frequency and have the radio go to that frequency or, the radio can be "tuned" either up or down in frequency in 10 Hz, 100 Hz, 1 KHz, or 5 KHz steps.

The transceiver may be switched to the Memory Mode. The operator can then step through the memories or a specific memory channel can be selected.

If your transceiver or receiver stores its filter settings in the VFOs or in memories then by selecting the proper VFO or memory you can change your filter settings.

1.3.2 INCLUDED COMPONENTS

Your HL-60, HamLink, package contains the following items:

- o HL-60, HamLink
- o HamLink Operating Manual
- o Warranty Registration card
- o Wall Transformer 12 VDC
- o Telephone Cable with an RJ-11 at each end

1.3.3 OPTIONAL COMPONENTS

OP-Link Model OP-80 - One of the options for your HamLink is the OP-80, OP-Link. This is a small battery-operated accessory that goes at the user end of the phone connection with HamLink to allow the sending of high-speed CW. A standard electronic keyer or hand key plugs into OP-Link and allows the sending of CW at over 40 words-per-minute. In addition, there is a jack on OP-Link that will accept a Yaesu YH-2 or Icom HS-10 headset/boom-microphone so you can obtain improved transmit audio with a microphone that has a frequency response curve tailored for Amateur use rather than using the standard element in the telephone handset. There is also a jack on OP-Link which will accept a standard stereo headset like the one used with all portable tape players.

Icom Interface Cable Model HL-61 - This cable plugs into the back of HamLink and into an Icom receiver or transceiver that has a CI-V computer control port. With this cable the user does not have to do any soldering at all to use HamLink.

Kenwood Interface Cable Model HL-62 - This cable plugs into the back of HamLink and into any Kenwood receiver or transceiver that has the Kenwood computer interface port. With this cable the user does not have to do any soldering at all to use HamLink.

Yaesu Interface Cable Model HL-63 - This cable plugs into the back of HamLink and into a Yaesu FT-890, FT-990, FT-1000, FT-747GX, or FT-757GXII. With this cable the user does not have to do any soldering at all to use HamLink. Provision is made with this cable to interface to both types of CAT interface connectors that Yaesu uses on the above radios.

1.3.4 OTHER EQUIPMENT YOU WILL NEED

During the initialization of the HL-60 you will need a true Touch Tone telephone with an RJ-11 connector at the end of its cord.

1.4 EQUIPMENT REQUIREMENTS

HamLink can be used to control most Icom, Kenwood, and Yaesu radios that have a computer control port on them.

1.4.1 ICOM

Any Icom transceiver or receiver that has the CI-V computer control port can be used with HamLink. If you have an older radio that has a CI-IV computer control port, you may be able to adapt the radio using an Icom UX-14, CI-IV to CI-V, level converter. At initialization HamLink searches through all of the possible radio addresses to determine what kind of Icom equipment it is connected to and then memorizes this information automatically. You do not have to program any address information into HamLink to allow it to control your radio.

1.4.2 KENWOOD

Any Kenwood transceiver or receiver that has an active computer control port (6 pin DIN socket) can be used with HamLink. You do not have to program any address information into HamLink to allow it to control your radio. **With some Kenwood radios you will have to install Kenwood's computer interface kit in your radio to activate the computer port. Refer to your Kenwood manual for this information** (the 50 series of radios come with the computer port active). You do NOT need Kenwood's optional RS-232 (IS-232C) adapter for use with HamLink.

1.4.3 YAESU

HamLink may be used to control a Yaesu FT-890, FT-990, FT-1000, FT-747GX, or a FT-757GXII. These are the only Yaesu transceivers that are currently supported by the HL-60. AEA's optional interface cables do take into account that Yaesu uses two different computer port connectors on these radios. An adapter is included with each HL-63 cable to accommodate the different computer port connectors.

1.5 SPECIFICATIONS

The specifications for the HL-60 are listed below:

General

Power	110 VAC or 8.5 to 13 VDC
Temperature	0 to 35 degrees C
Size	8" (W) x 5" (D) x 2" (H)
Weight	2 pounds

Radio Interface

Any Icom HF, VHF, UHF, or receiver with a CI-V computer port

Any Kenwood with an active computer control port (see 1.4.2). The optional IS-232 interface is not required.

Yaesu FT 890, FT-990, FT-1000, FT-747GX, FT-757GXII

Software Initialization by Owner

Password	Any 4-digit numeric code
Answer Mode	Answer mode type or number of rings before answer
Hang Up Time	Time before HamLink hangs up due to inactivity

Additional Specifications

Indicators	Power, Phone line off hook
Adjustments	None

2.1 INSTALLATION

The HL-60 is easy to install. All that is required is to connect the HL-60 to your receiver or transceiver and the telephone line. If you purchased one of the optional interface cables you will simply plug the cable into your radio and the HL-60. You will also connect the HL-60 to the phone line. If you are going to build your own interface cable rather than buy ours then please see Appendix A for the wiring diagram and parts list.

2.1.1 UNPACKING

Carefully remove the HL-60 and its Wall Transformer from the box and its packing material. If there is visible damage, please contact the dealer or shipper. Do not attempt to install or use a damaged HL-60 or wall transformer.

2.1.2 CONNECTING HamLink

If you did not buy the optional interface cable that goes from the HL-60 to your radio please refer to Appendix A of this manual for the parts that are required to build the cable and the wiring diagram. You will need either one of the optional cables that AEA sells or you will need to build your own cable to proceed further with the installation of your HamLink.

Static Electricity Safety: As with all electronic equipment HamLink can be damaged by static electricity. A few simple precautions are in order when working with HamLink. Whenever plugging a cable into hamlink touch the HamLink case with your hand before you touch the cable connector to its socket on HamLink. When moving the internal jumper in HamLink again touch the case with your hand before you touch the electronics in HamLink. By touching the case first you will greatly reduce the possibility of damage.

1. Remove the cover screws on the ends of HamLink and lift off the cover.
2. Plug the 9 pin (DB-9) connector (the connector from which all of the various cables emanate) on the interface cable into the 9 pin socket on the back of HamLink.

3. Plug the 1/4-inch phone jack on the interface cable into the CW key socket on your transceiver. If you are interfacing the HL-60 to a receiver do not connect this cable.

4. Plug the microphone connector on the interface cable into the mic jack on your transceiver. If you are interfacing the HL-60 to a receiver do not connect this cable.

5. Plug the computer interface connector on the interface cable into the computer port on your radio.

6. Plug the remaining cable into the external speaker socket on your radio.

7. Plug the power connector on the wall transformer into the power connector on the back of HamLink. If you are using 12 VDC the connector is not polarity sensitive.

8. DO NOT connect the RJ-11 cable from HamLink to the telephone line.

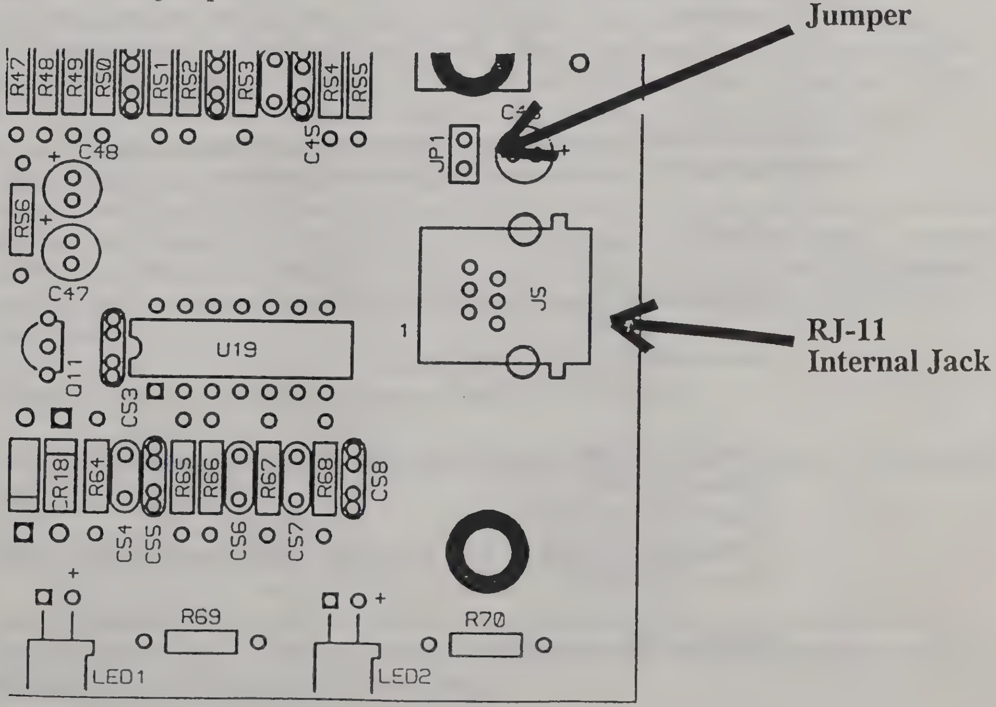
3.1 INITIALIZATION

Follow these steps carefully and in the **exact order** listed to insure that you properly initialize HamLink.

1. **Turn power to your radio off.**

2. Connect a Touch Tone telephone into the RJ-11 jack that is mounted inside HamLink (not the one on the back panel labeled Telephone). DO NOT CONNECT HAM LINK TO THE TELEPHONE LINE.

3. Locate the small 2-pin jumper on the HamLink printed circuit board. Make sure it is connected to both pins on the header. See the drawing below for the location of this jumper.



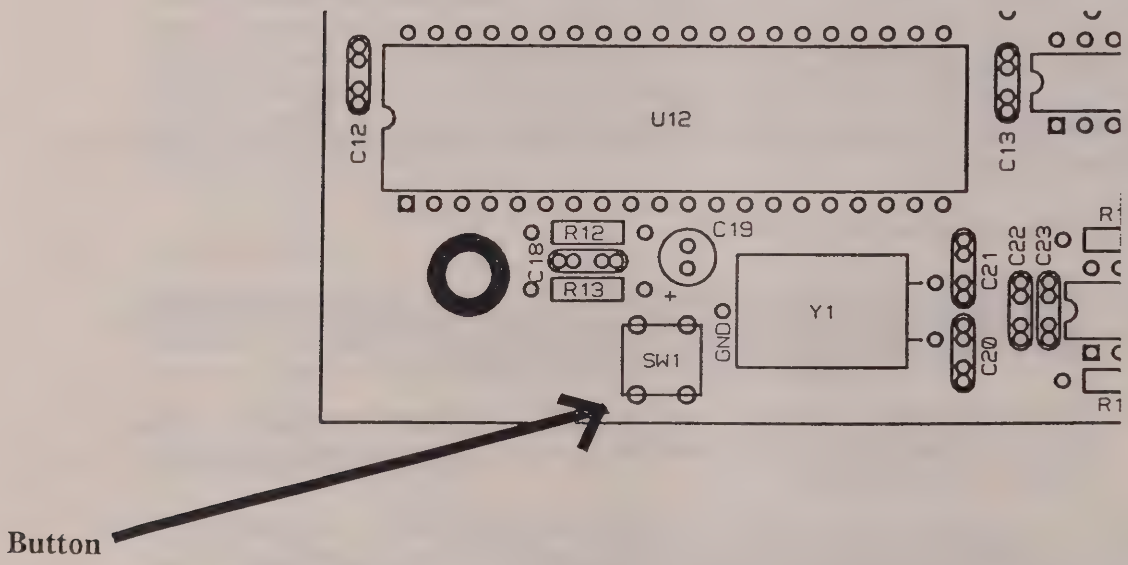
Jumper

**RJ-11
Internal Jack**

4. Plug the wall transformer into a 110-VAC wall outlet and note that the power light on HamLink will come on.

5. Talk into the telephone and you should hear yourself in the telephone handset. If you do not, it may be necessary to reverse the red and green wires that come from the telephone's cord inside the telephone or try another telephone. Some older telephones are polarity sensitive. This effect may also show up as no TouchTone audio. Verify the Touch Tone buttons on the telephone are working by depressing one of the keys. You should hear the two tones in the telephone handset. Also note that the telephone you use to access HamLink must be a true Touch Tone telephone. Some push-button phones only generate pulses and do not generate Touch Tones. You must use a true Touch Tone telephone to access HamLink at all times.

6. Lift the handset on the telephone and listen. Push the reset button on HamLink until you hear 2 beeps and then release the reset button.



7. Depress buttons on the phone to enter the code for the radio you are using from the table below, then **immediately turn the power to your radio on.**

Icom	10
Kenwood 140, 440, 680, 711, 940, and 811	20
Kenwood 50, 450, 690, 850, and 950	21
Yaesu FT-890	30
Yaesu FT-990	31
Yaesu FT-747GX	32
Yaesu FT-757GXII	33
Yaesu FT-1000	34
Radio with no computer port	99

If you are using an Icom radio HamLink will search for the specific address of your radio. It will beep about every two seconds while it is doing this.

When HamLink has established communications with your Icom, Kenwood, or Yaesu radio it will send four (4) beeps.

If at any time in this process HamLink can not find your radio or you entered an incorrect code from the table above HamLink will beep eight (8) times, pause and beep twice. If this happens you should turn your radio off and go to step 6.

The 99 code can be used to allow HamLink to operate with a radio that does not have a computer port. All the commands that access the computer port are deactivated.

8. After you hear the 4 beeps from Hamlink signifying it has started communications with your radio you must enter a 4-digit password. Depress any four different numeric buttons on your telephone to program the password you will use when you access HamLink. **Write your password down** so you don't have to go through the initialization process a second time!

   Note: HamLink has now stored this information into electronically erasable EEPROMs. This memory does not require a battery backup and does remember what has been stored in it while the power is turned off.

   You now can control your radio via HamLink with the telephone you have used to program HamLink. We advise that you try the various command codes to familiarize yourself with the operation of HamLink while you can watch the results on the radio.

9. There are two major ways in which HamLink will answer the telephone. The default mode is that HamLink answers on the fourth ring. The other major mode is where HamLink will only answer after you have called, hung up, and recalled. This mode is used when sharing a telephone line with a FAX machine or a telephone answering set. You can program the answer mode with the #89n# command where n is the number of rings that you want to occur before HamLink answers and "0" means HamLink will answer after it has been called back (see page 10). Choose and program the answer mode you desire at this time. You can change your choice at any later time.

10. Program the inactivity timer with the #88n# command. This sets the amount of time that can elapse without a touch tone being sent to HamLink before it hangs up. We recommend a setting of 3 minutes (see page 10). The #883# command would set the inactivity timer to 3 minutes. You can change this value later if you desire.

11. Unplug the wall transformer from the wall.

12. **Move the jumper from both pins and reinstall it so that it is only connected to one pin.**

13. Unplug the telephone from the RJ-11 jack inside the HL-60.

14. Replace the case on HamLink. Make sure the case screws are installed and tightened just snugly. It is possible to over torque the screws and strip out the sheet metal on the lower part of the case.

15. Plug the RJ-11 cable that was supplied with your HamLink into the RJ-11 connector on the back of HamLink. If you do not have an RJ-11 connector on your telephone line an adapter can be purchased from Radio Shack (part number 279-353).
16. Plug the wall transformer back into the wall outlet.

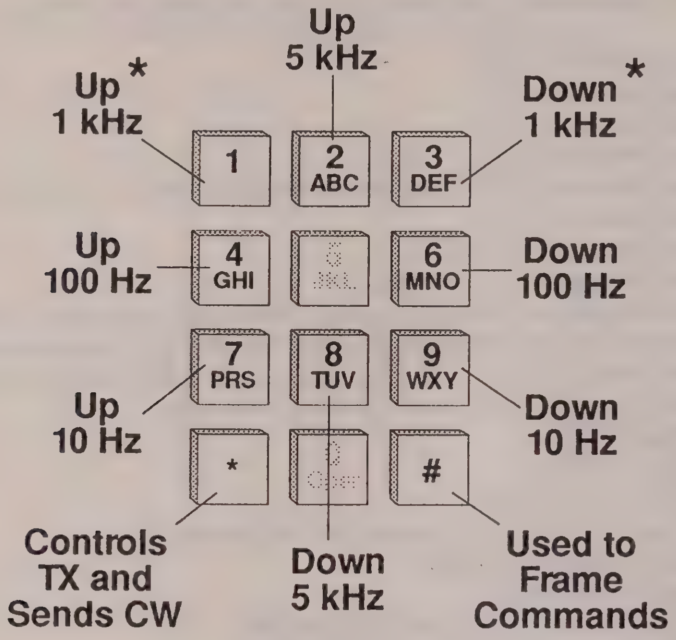
HamLink is now ready to use.

4.1 COMMANDS

Each of the HamLink commands and their function are described below:

#11#	Set Mode to LSB
#12#	Set Mode to USB
#13#	Set Mode to AM
#14#	Set Mode to CW
#15#	Set Mode to RTTY (not recommended for use via HamLink)
#16#	Set Mode to FM
#17#	Set Mode to Wide FM
#2KKKKK#	Set Current VFO Frequency
#2KKKKK*HH#	This command sets the current VFO to the specified frequency. There must be at least three digits after the 2 key in the command and before the ending # key. The frequency entry may contain a decimal point using the "*" key, after the kilohertz entry.
#31#	Select VFO A
#32#	Select VFO B
#33#	VFO A = B Mode
#34#	A and B VFO Frequencies Set Independently
#51#	Select Memory Mode
#52#	Select VFO Mode
#53nn#	Select Memory Channel Number NN
#55#	Start Scan (either VFO or Memory) Depressing any button on the telephone will stop scan
#59nn#	Set the maximum number of memory channels to be scanned
#60#	Turn Logic Output on DB-25 pin 4 On
#61#	Turn Logic Output on DB-25 pin 4 Off
#62#	Turn Logic Output on DB-25 pin 5 On
#63#	Turn Logic Output on DB-25 pin 5 Off
#64#	Turn Logic Output on DB-25 pin 6 On
#65#	Turn Logic Output on DB-25 pin 6 Off
#66#	Turn Logic Output on DB-25 pin 7 On
#67#	Turn Logic Output on DB-25 pin 7 Off
#68#	Turn Logic Output on DB-25 pin 8 On
#69#	Turn Logic Output on DB-25 pin 8 Off
#71#	Turn Logic Output on DB-25 pin 9 on for 100 ms
#88n#	Auto Hang-Up Time W/O tone 0 Will only hang up with #0# command 1 1 Minute 2 2 Minutes etc. Up to 9 Minutes
#89n#	Set Phone Answer Mode 0 Answer when HamLink is Called Back 1 Answer on First Ring 2 Answer on Second Ring etc. up to 9 rings
#91#	Announce Frequency
#92#	Announce Mode
#93#	Announce Both Frequency and Mode
#94#	Announce VFO B Frequency
#0#	Hang Up. Also turns off power logic output.

Not all functions that HamLink is capable of are able to be controlled via the computer port in all radios. If, for instance, your radio does not have a scan mode then you will not be able to scan even with HamLink connected to your radio. Some radios have scan but the manufacturer did not provide the ability to control the scan via the computer port on the radio and therefore HamLink cannot access the scan mode. Refer to your owner's manual for this information.



* Scans memory in memory mode

The following keys on the telephone can be used to tune the receiver or transceiver in small steps:

Up	Down	Step
2	8	5 KHz
1	3	1 KHz
4	6	100 Hz
7	9	10 Hz

In addition when you are in the memory mode the 1 key will step the memories up by one channel and the 3 key will step them down one channel.

5.1 OPERATION

Hamlink must be initialized as described in Section 4 of this manual before it is possible to use it. If you have not initialized hamlink (allowed it to determine which radio it is connected to and loaded in your password) please do so now.

The telephone you use to access HamLink must be a true Touch Tone telephone. Some push-button phones only generate pulses and do not generate Touch Tones. You must use a true Touch Tone telephone to access HamLink at all times. If you push a button on the phone and hear tones then you have a true Touch Tone telephone.

5.2 SETTING UP YOUR RADIO

Turn the power to your radio on. If you plan to scan memories with HamLink or scan a range of frequencies load your memories and/or the band limits into the radio. You can not load frequencies into your memories with HamLink.

Set the filters on your radio for both SSB and CW.

Turn your VOX gain all the way down to minimum.

The easiest way to set your radio up so it works with HamLink is to plug a normal key into the CW jack and mic with a push-to-talk button into the mic jack. Set the controls on the radio so when the key is depressed in the CW mode the radio operates in semi-automatic break-in. Change the radio's mode to SSB and with just the mode change the radio must transmit on SSB by depressing the push-to-talk button on the mic.

Set the volume control for a comfortable listening level. You will probably have to unplug the external speaker jack to the HamLink to do this. Remember to plug it back in when you are done.

Set the mic gain control as you do normally.

Both the volume control and the mic gain control will have to be finally set by experimentation while you are actually using HamLink remotely. You cannot set these levels accurately while you have a telephone connected to the internal RJ-11 jack on HamLink. Have a friend call your station via HamLink and have them tell you where to set the volume control on the receiver by listening to your signal as they are actually using HamLink. If you set the volume control too high the limiters in HamLink, that protect the phone system, will cause distortion on the receiver audio or you may experience false decodes by the touch-tone decoder inside HamLink.

Experience has shown that the most common problem an initial user experiences with HamLink is that the receiver volume is set too high and this causes falsing. Falsing is indicated when the radio shifts frequency without a command being given or when a command is entered and 3 beeps are heard indicating that HamLink has rejected the command.

Have your friend transmit over your radio on SSB and adjust the mic gain so the ALC reading is the same as when you transmit with your normal mic.

Once you have determined the best settings for these two levels note the position of both knobs for future reference while using HamLink.

5.3 Setting Up HamLink

Make sure HamLink has been initialized per section 3 of this manual. It will not operate if it has not been initialized.

Other than connecting the HamLink to the radio and the telephone line there are no additional steps required to set HamLink up to work with your station.

Insure that you have power to HamLink and that its power light is on.

5.4 USING HamLink ON THE AIR

5.4.1 CALLING HamLink BY TELEPHONE

Call HamLink by telephone. If you have set HamLink during initialization to answer after "call back" you will have to hang up and call again within 30 seconds. HamLink will then answer immediately. If you have set HamLink to answer after a certain number of rings then wait for that number of rings plus one (the rings that you hear on the telephone when you place a call may have no relation to the rings that occur at the number you are calling on some phone systems). HamLink will answer the telephone.

If you do not enter a correct password when calling HamLink on the telephone HamLink will hang up after three incorrect password tries or after 30 seconds has elapsed.

When HamLink answers the phone and beeps four times enter the personal password that you entered during initialization from your Touch Tone telephone. You will immediately hear audio from your receiver. You will be listening to the last frequency and mode to which your radio was tuned.

Depress #93# to have HamLink announce both the current frequency and mode.

5.4.2 CHANGING FREQUENCY

You can change frequency by depressing #2KKKKK.HH# where KKKKK is the frequency in kilohertz and the "." is the "*" key and HH is the Hertz part of the frequency. To set the frequency to 14235.34 KHz you would depress the following keys on the Touch Tone telephone #214235*34#.

If you enter a frequency that is on a different band, then your radio will switch bands as well as go to the new frequency.

You can also "tune" your radio from the keypad on the phone. See section 4.1 for the keys on the phone that do this.

5.4.3 SPLIT-FREQUENCY OPERATION

To operate split mode (transmit on one frequency and listen on another one) for working DX you must do the following.

Turn the split function on your radio to "ON".

Use the #34# command to tell HamLink to allow the VFO frequencies to be set independently.

Load the desired transmit frequency into VFO B with the #32# function and then the exact transmit frequency with the #2KKKKK*HH# function.

Load the desired receive frequency into VFO A with the #31# function and then enter the exact frequency with the #2KKKKK*HH# function.

Note: On most radios it is not possible to control the split function from the computer port. We take care of this by having the user manually enable the split function on the radio. Once the split function is on if the HamLink user turns on the "VFO A = VFO B" function on HamLink with the #33# function then HamLink will load the same operating frequency into both the A and B VFOs (since the split function is enabled at the radio), this will result in simplex operation. The user will experience a slow down in the response of HamLink in this situation since while operating with the radio set on split mode and HamLink set for simplex the operating frequency must be loaded into both VFOs which, depending on the radio, can take up to several seconds. The moral of this story is if you are not going to operate split frequency then leave the split function "OFF" on your radio and enable the #34# function on HamLink. Use the #34# command so HamLink only loads the current VFO with the operating frequency and HamLink's control will be twice as fast.

5.4.4 VOICE SYNTHESIZED FREQUENCY ANNOUNCEMENT

You can have the operating frequency and or mode announced by synthesized voice any time HamLink is operational by using any of the #9x# functions. See section 4.1.

5.4.5 MODE CHANGE

You can specify mode with any of the #1x# functions while HamLink is active. See section 4.1.

5.4.6 TRANSMIT/RECEIVE SWITCHING

The "*" key is used to switch from receive to transmit (USB, LSB, AM, FM, and RTTY modes). While you are transmitting depressing the "*" button will switch you back to receive. While you are in the CW mode the "*" button will key your transmitter. You will be able to send CW with the "*" button until your finger gets tired! If your radio is able to work full-break-in HamLink will support this mode! Also see section 8.2 for a description of the OP-Link option.

5.4.7 HamLink HANG-UP

To end your use of HamLink use the #0# function.

If you do not depress any key on HamLink for three minutes (default - see #88n# command) HamLink assumes that you have been disconnected and will hang up the phone line and cause the radio to go to receive. HamLink will beep 4 times 20 seconds before it hangs up the phone as a warning.

The #88n# command allows the 3 minute auto hang-up period to be changed. The value of "n" will determine the number of minutes before hang-up if no keys have been depressed on the telephone.

0 - The auto hang-up feature is disabled **(this setting not recommended)**
1 - 1 minute
2 - 2 minutes
etc.

5.4.8 SCAN

Before scanning memory with HamLink set the number of memory channels to be scanned with the #59nn# command where nn is the maximum number of channels to be scanned.

To scan memories use the #51# command to switch the radio to the memory mode. You can then start memory scan with the #55# command. The radio will stop and resume scan just as if you had started scan from the radio itself. HamLink does not have control of the radio stopping on a busy channel or resume scan.

If your radio has the ability to scan a range of frequencies under computer control then HamLink can command your radio to scan in this manner as well. From the VFO mode just enter the command #55#.

Scanning in any mode can be stopped by depressing any button on the telephone.

6.1 USER-SUPPLIED ACCESSORIES

6.2 EXTERNAL OUTPUTS

There are 7 individual logic outputs on the DB-25 (25-pin connector) on the back of HamLink. There is a logic output that can be used to control the AC power to your station. One of the 7 logic outputs can be pulsed high for 100 mili-seconds each time a valid code is received.

Each of these logic outputs are active high (+5 VDC). They are connected directly to a CMOS IC and can only source about 4 ma each. It will be necessary to use an external transistor and relay to control some other device. A circuit for this is shown in Appendix B.

Each of the logic outputs, their commands, and their output pin on the DB-25 are shown below:

On Code	Off Code	DB-25 Pin
#60#	#61#	Pin 4
#62#	#63#	Pin 5
#64#	#65#	Pin 6
#66#	#67#	Pin 7
#68#	#69#	Pin 8
#71#		Pin 9 pulsed high for 100 ms
Power		Pin 16

The "Power" pin is special in that it has no control code. When HamLink receives a valid password after answering the telephone this line will go high. When HamLink disconnects from the phone line Pin 16 on the DB-25 will go low again. It is intended that this line be used to control power to the station if you desire to do so. Again this pin is only able to source 4 ma and so the relay-driver circuit shown in Appendix B or an equivalent must be used.

Pin 9 on the DB-25 connector is only pulsed high for 100 mili-seconds when the #71# code is sent. It is intended to control a latching relay or any other control device that only requires a pulse to activate it (your antenna tuner "tune" switch).

Care should be taken when wiring any optional device to HamLink to use shielded cable and good engineering practices. HamLink does have a microprocessor in it and if an inferior cable is used it can radiate birdies that your receiver will pick up.

6.3 ROTATOR CONTROL

It is possible to use your HamLink to control a rotator. Simply use one of the logic outputs (Section 6.2) with its associated relay driver from Appendix B to connect to the CCW switch on your rotator control box. Connect a different logic output to the CW switch on your rotator control box. Connect a third logic output to the brake switch on the rotator control box.

In operation send the code for the logic output used to release the brake on your rotator. Then send HamLink the code to turn the rotator fully CW. Wait one minute to allow the rotator to reach its rotation limit. Send HamLink the code to release the relay connected to the CW switch. All commercial rotators that we know of rotate at one revolution per minute. You simply send the code that rotates the antenna CCW for the amount of time it takes to point the antenna where you want it pointed. Fifteen seconds is 90 degrees, 30 seconds is 180 degrees, etc. Make sure you send the *brake on* code before you leave the station.

6.4 OTHER ACCESSORIES

Any other accessory that can be controlled by a relay can also be connected to HamLink. Use your imagination and you will find all kinds of uses for these six logic outputs on HamLink.

7.1 IN CASE OF TROUBLE

Application and trouble shooting assistance may be had by calling AEA between our 8:00 to 11:30, 1:00 to 4:30 working hours in Lynnwood, Washington. The Customer Service phone number is (206) 775-7373.

You may wish to attempt to solve problems locally, using other hams or an AEA dealer. A helpful Amateur with equipment similar to your own may literally be just around the corner.

AEA provides Technical Support for its line of Amateur Radio equipment by way of your personal computer and modem on CompuServe. Just leave mail for 76702,1013. We check into CompuServe during every business day. If you are not a CompuServe user and would like to receive a free introductory CompuServe membership call 1-800-848-8199 and ask for representative 48. Tell them you want a starter kit.

Many of the AEA products that are sent to us for repair are in perfectly good order when we receive them. Please read this manual carefully and make sure you have correctly interfaced your unit before you call.

In all cases the unit must be shipped to us freight prepaid. We will not accept COD on returned units. **Please also include a complete description of the problem you are having**. This is the most important step in returning a unit. In addition, make sure you have included your return address plus a daytime and evening telephone number where we can reach you if we need to.

Typically, we will service the product in five to ten working days after it has arrived at AEA if we have all the facts. If we must call you, it may take longer. PLEASE include a letter stating the problem and where you can be reached by telephone. If at all possible please give us both a work and home number where we can reach you and the times you are available to take calls at both numbers.

8.1 OPTIONS ACCESSORIES FOR HamLink

At the time this manual was written there were 4 optional accessories for HamLink. Each of them is described below:

8.2 OP-80 OP-Link

The OP-80's primary application is to allow the sending of high-speed CW. It also provides a jack for a Yaesu YH-2 or Icom HS-10 headset with boom mic. The YH-2 and HS-10 have microphones that have a response curve tailored for Amateur use. In most cases using them will improve your transmitted audio over what is available from the telephone handset. In addition, there is a jack for the use of a pair of stereo headsets like those used with a portable tape recorder.

The OP-Link goes at the user end of the telephone line with HamLink. It has a 1/4" phone jack that allows the user to plug in their choice of keyer, bug, or hand key for sending high-speed CW to HamLink.

8.3 HL-61 ICOM INTERFACE CABLE

The HL-61 is the optional interface cable for use with Icom radios. It is assembled from the highest quality cable and connectors and will allow the HL-60 to be interfaced to a Icom radio that has a CI-V computer control port.

8.4 HL-62 KENWOOD INTERFACE CABLE

The HL-62 is the optional interface cable for use with Kenwood radios. It is assembled from the highest quality cable and connectors and will allow the HL-60 to be interfaced to a Kenwood radio that has a computer control port (6 pin DIN socket).

8.5 HL-63 YAESU INTERFACE CABLE

The HL-63 is the optional interface cable for use with Yaesu radios. It is assembled from the highest quality cable and connectors and will allow the HL-60 to be interfaced to the FT-890, FT-990, FT-1000, FT-747GX, or FT-757GXII radios. It does include an adapter cable to change the computer control port connector from the normal DIN connector to a miniature DIN connector used with some Yaesu radios.

APPENDIX A

The wiring diagram for each of the interface cables is contained on the following page. A parts list for each cable is shown below:

ICOM

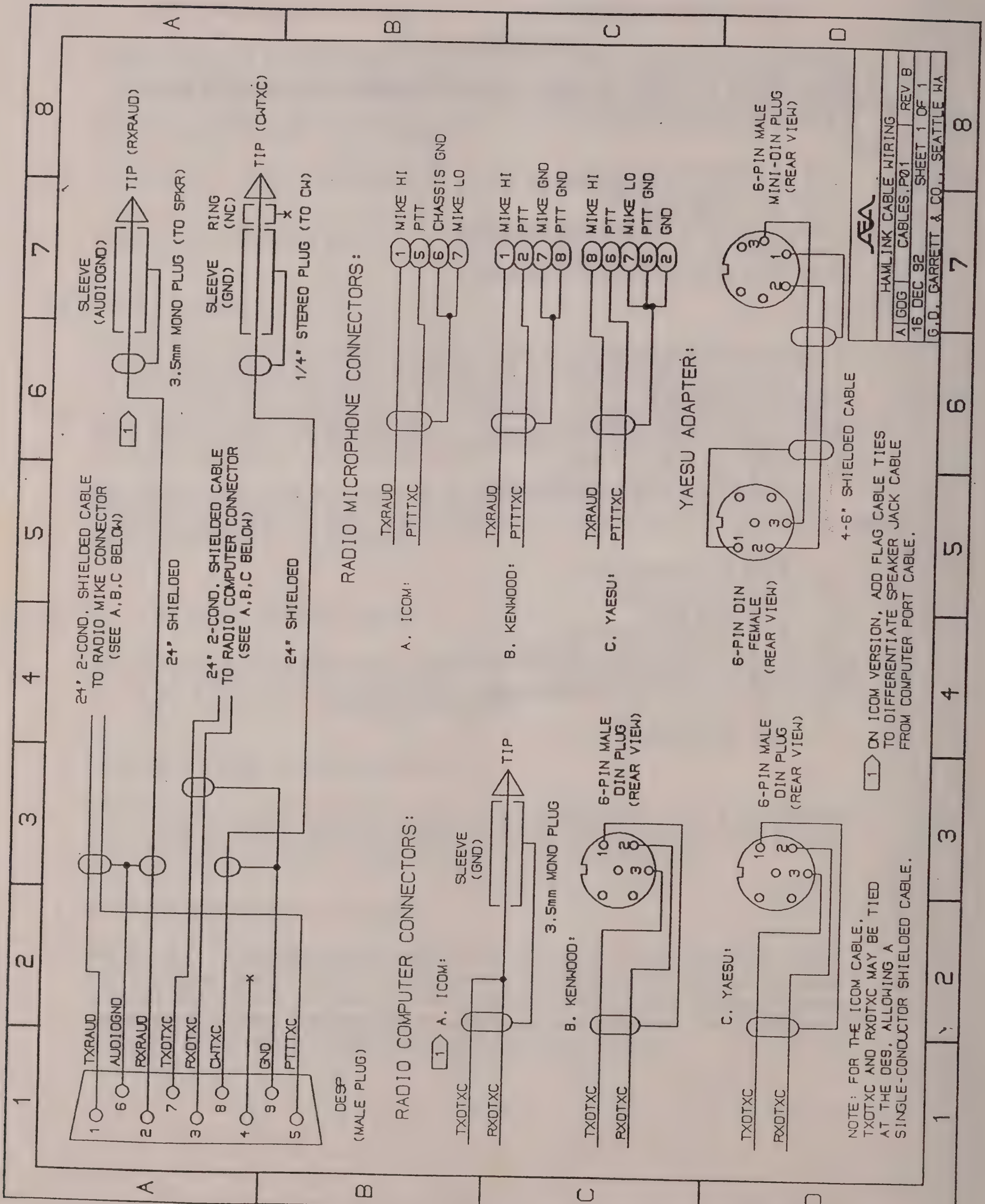
1 ea	8 Pin microphone plug
2 ea	3.5 mm stereo plugs
1 ea	1/4" Phone Plug
1 ea	9 pin "D" Connector Male solder cup
1 ea	9 pin "D" Connector hood
92 in	22 AWG 2 conductor shielded cable

Kenwood

1 ea	8 Pin microphone plug
1 ea	3.5 mm stereo plugs
1 ea	1/4" Phone plug
1 ea	6 pin Male DIN connector
1 ea	9 pin "D" Connector male solder cup
1 ea	9 pin "D" Connector hood
92 in	22 AWG 2 conductor shielded cable

Yaesu

1 ea	8 Pin microphone plug
1 ea	3.5 mm stereo plugs
1 ea	1/4" Phone plug
1 ea	6 pin Male DIN connector
1 ea	9 pin "D" Connector male solder cup
1 ea	9 pin "D" Connector hood
98 in	22 AWG 2 conductor shielded cable
1 ea	6 pin Mini DIN Male
1 ea	6 pin Female DIN

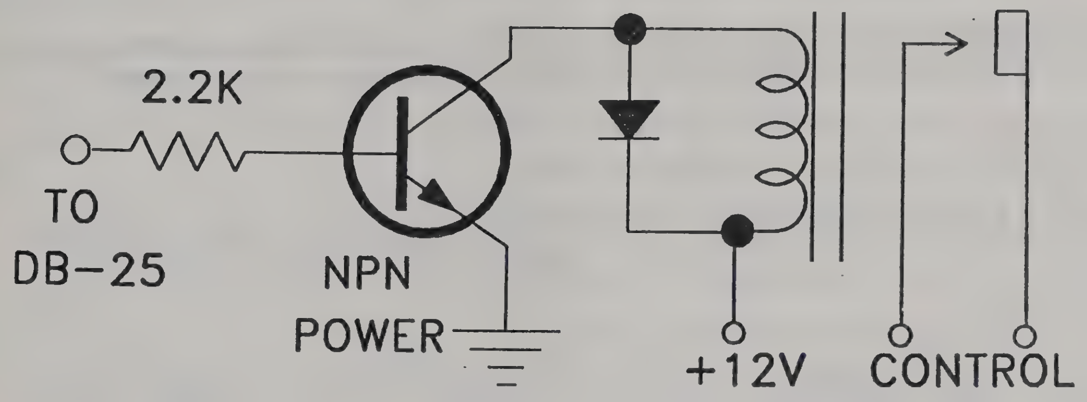


1 ON ICOM VERSION, ADD FLAG CABLE TIES TO DIFFERENTIATE SPEAKER JACK CABLE FROM COMPUTER PORT CABLE.

NOTE: FOR THE ICOM CABLE, TXDTXC AND RXDTXC MAY BE TIED AT THE DE9, ALLOWING A SINGLE-CONDUCTOR SHIELDED CABLE.

APPENDIX B

The diagram below shows a sample schematic for a transistor driver and a relay that could be connected to the logic or power-output lines on HamLink to control external devices.



The following parts are required.

Qty	Part	Radio Shack Catalog Number
1 ea	Transistor MPS 2222A (2N2222)	276-2009
1 ea	25 Pin D Connector Male	276-1547
1 ea	25 Pin D Connector Hood	276-1549
1 ea	1N4001 Diode	276-1101
1 ea	DPDT Relay 12 VDC coil	275-218
1 ea	Relay Socket	275-220
1 ea	Resistor 2.2K 1/4 watt	271-027
1 ea	12 VDC 500 ma Power Supply	273-1652

Appendix C

Federal Communications Commission (FCC) Regulations

To comply with FCC regulations, the following requirements must be met:

- The following information is required to be included in this manual to be in compliance with FCC regulations.
- The FCC Registration Number of this device (1T9USA-74385-KX-N) and Ringer Equivalence Number (0.8B), if requested by the telephone company, must be reported.
- The sum of Ringer Equivalence Numbers for all devices connected to a single telephone line should not exceed 5 for reliable operation.
- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- Repair work on this device must be done by **Advanced Electronic Applications, Inc.**, or an authorized service center.

Appendix D

Had's Hints

Had Allhands, N7REN is our Customer Service Manager. He has developed this list of thoughts regarding HamLink. We thought you would find them of interest.

1. Most HamLink units leave the factory initialized for a Kenwood radio with a password of "1234". If you want to skip the initialization routine and you are using a Kenwood you might want to just plug the cable in and try your unit.

2. If you find it necessary to return your HamLink for any reason please include your personal password. This helps our service technician duplicate your problem since we can access HamLink without reinitializing it and overwriting your preset conditions with the default values.

3. If you are using a Yaesu radio and are having trouble initializing your HamLink (you can't get past section 3.1 step 7). Place a 2.7K ohm 1/4 watt resistor from the cat serial out line, pin 2 on the DIN connector to ground (pin 1). We thank Yaesu Customer Service for this fix which is contained in Yaesu Application Note AN-93201.

4. Another visually impaired ham is using her HamLink with a phone plugged into the internal RJ-11 jack because she can get a voice announcement of what her radio is doing with the #9x# functions and therefore is better able to control her radio.

Note: If you have a unique use or idea for HamLink let us know and we will add it to this section of the manual.

Warranty

Advanced Electronic Applications, Inc., warrants to the original purchaser that this product shall be free from defects in material or workmanship for one year from the date of original purchase. In order to obtain warranty service (1) Complete and mail the warranty registration card within 10 days to Advanced Electronic Applications, Inc., and (2) Send written notification to the address below or telephone as soon as possible after discovering a possible defect.

Advanced Electronic Applications, Inc.
Attention: Service Department
2006 196th SW
Lynnwood, WA 98036

The written notification must include a copy of the invoice. Include a description of the defective part or condition, with details of the electrical connections to associated equipment and list such equipment. Please enclose your name, phone number, and address. Shipping charges for any parts or units submitted for replacement under this warranty must be paid by the purchaser.

Correct maintenance, repair and use are important to insure proper performance from this product. Carefully read the Instruction Manual. This warranty does not apply to any defect AEA determines is caused by (1) improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specification of the original parts: (2) misuse, abuse, neglect, or improper installation: (3) accidental or intentional damage. The field installation of circuits or batteries according to the instructions in the manual will not nullify this warranty.

All implied warranties, if any, terminate one year from the date of original purchase. AEA is not responsible for damage to other equipment or property or any other consequential or incidental damage of any kind whether based on contract, negligence, or strict liability. Maximum liability shall not, in any case, exceed the purchase price of the unit.

The foregoing constitutes AEA's entire obligation with respect to this product. The original purchaser and any user or owner shall have no other remedy and no claim for incidental or consequential damages. Some states do not allow limitations of how long an implied warranty lasts or do not allow the excluding of incidental or consequential damages, therefore, the above limitations and exclusions may not apply to you.

This warranty gives specific legal rights. You may also have other rights which vary from state to state.

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4. One of our customers is plugging his cordless telephone into the internal RJ-11 jack on HamLink (after installing the jumper back on both pins) and using it to operate his HamLink from the sun deck!

5. Another visually impaired ham is using her HamLink with a phone plugged into the internal RJ-11 jack because she can get a voice announcement of what her radio is doing with the #9x# functions and therefore is better able to control her radio.

Note: If you have a unique use or idea for HamLink let us know and we will add it to this section of the manual.

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The foregoing constitutes AEA's entire obligation with respect to this product. The original purchaser and any user or owner shall have no other remedy and no claim for incidental or consequential damages. Some states do not allow limitations of how long an implied warranty lasts or do not allow the excluding of incidental or consequential damages, therefore, the above limitations and exclusions may not apply to you.

This warranty gives specific legal rights. You may also have other rights which vary from state to state.

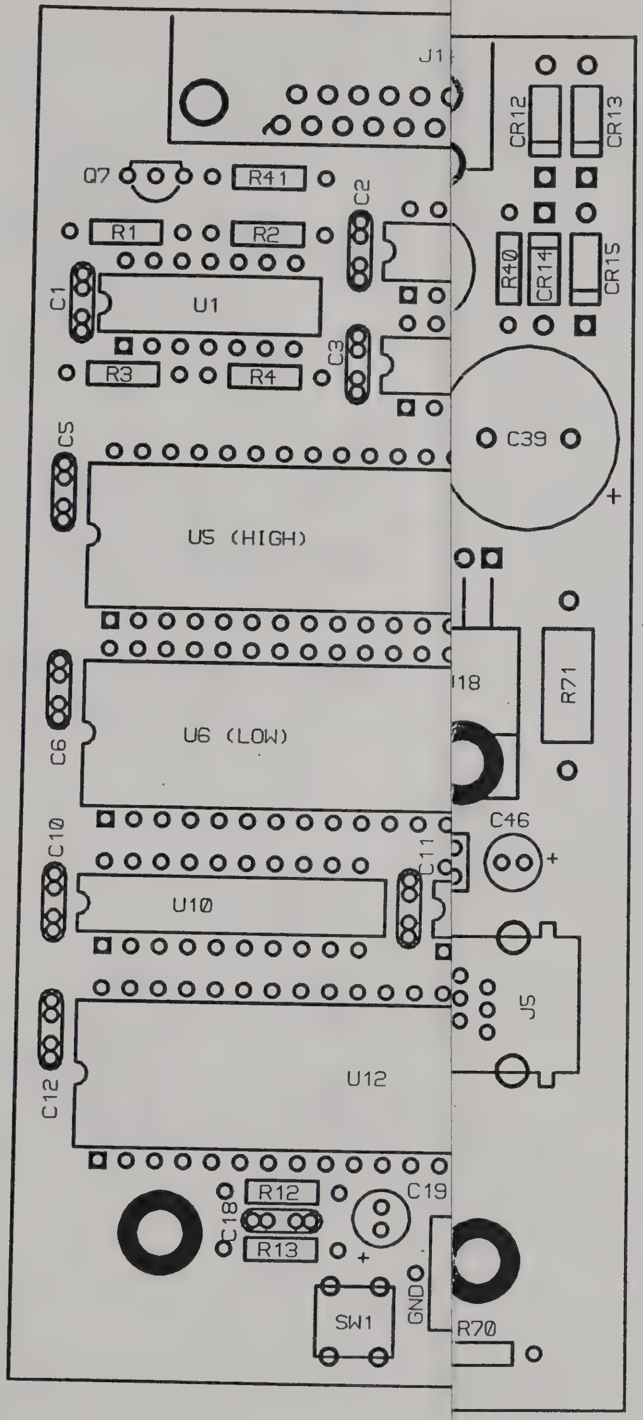
HL-60 BOM

"HamLink"

Rev I 2-4-93

Qty	Part No	Description	Reference Designator
8	130-106	10 uf 16V	C19,25,26,36,40,46,47,48
12	124-104	.1 uf mono	C4-7,12,16,17,22,29,31,34,45 (C1-3,8-11,13,23,28,41,53 not installed)
1	130-226	22 uf 16V	C38
1	124-333	.33 mf mono	C30
3	111-102	.001 uf 5% mylar	C37,54,61
3	111-472	.0047 uf 5% mylar	C44,56,57
7	111-103	.01 uf 5% mylar	C14,18,42,43,55,58,60
1	113-474	.47uf 250V Metalized Mylar	C24
1	130-108	1000 mf cap 16V	C35
1	130-228-1	2200 mf 16V electrolytic	C39
2	120-331-1	33 pf disk	C20,21
1	130-475	4.7 uf electrolytic	C15
1	120-473	.47 MONO	C59
1	769-036	Cable RJ-11 each end 7' long	
1	410-102	2 Pin header(.025 sq post)	JP1
1	412-125-2	DB-25 female PCB mount	J1
1	412-109-1	DB-9 female PCB mount	J3
2	400-028	EE PROM Socket 28 pin	U5,6
1	420-001-2	Power Plug for power transformer	
2	420-042-1	RJ-11 PCB mount socket 4 conductor	J2,5
1	420-001-1	Socket for power transformer	J4
1	779-001	Jumper for 2 pin header	JP1
1	650-355	Crystal 3.57954 MHz	Y2
1	650-011	11.0592 MHz Xtal	Y1
1	060-143-1	Lower Case half	
1	060-143-2	Upper Case half	
1	335-004	General Instrument H11A1	U15
2	314-001-1	LED 1 3/4 RED	LED1,2
4	760-104	Feed rubber self adhesive	Case
14	706-138	Screw Black #6 self tapping 1/4"	Case
2	700-137	Screw 6-32 x 3/8	PCB mount
1	331-014-1	74C14	U13
1	333-870	TT Decoder	U14
1	333-023-1	80C31 Slowest	U12
2	332-256	27C256-12	U5,6
1	330-001	7805 TO-220 Voltage regulator	U18
1	331-125-2	74HC125	U1
1	331-157-1	74HC157	U8
2	331-138-1	74HC138	U7,11
1	331-373-1	74HC373	U10

2	331-374-1	74HC374	U2,3
1	331-086-1	74HC86	U9
1	332-346	EEPROM	U4
2	330-403	MC 3403	U17,19
1	330-418	MC3418P CVSD	U16
1	041-160	LABEL HL-60 TELEPHONE	
1	013-128	PCB HL-60	
1	264-104-1	100K trim pot vertical adjust	VR2
1	264-102-5	1K trim pot vertical adjust	VR1
1	210-101	100 ohm 1/4W	R40
2	264-104-1	100K 1/4W	R9,16
20	210-103	10K 1/4W	R1-5,7,12,13,18,19,36,37,39, 42,47,52,54-56,64
1	210-475	4.7M 1/4W	R11
1	210-273	27K 1/4W	R46
7	210-102	1K 1/4W	R23,24,29,32,35,43,63
1	210-133	13K 1/4W	R10
1	210-151	150 ohm 1/4W	R44
2	210-153	15K 1/4W	R27,28
1	210-275	2.7M 1/4W	R25
2	210-204	200K 1/4W	R30,31
1	210-203	20K 1/4W	R21
1	210-221	220 ohm 1/4W	R69
1	220-221	220 ohm 1/2W 5%	R71
6	210-223	22K 1/4W	R6,8,33,34,38,41
3	210-332	3.3K 1/4W	R22,48,49
2	210-511	510 ohm 1/4W	R26,70
5	210-682	6.8K 1/4W	R45,65-68
3	210-392	3.9K 1/4W	R50,51,53
1	210-134	130K 1/4W 5%	R14
1	220-822	8.2K 1/2W	R17
1	210-564	560K 1/4W 5%	R73
1	230-330	33 ohm 1 watt	R72
1	210-473	47K 1/4W 5%	R15
1	510-019	Relay DPDT	K1
9	311-001	1N4001	CR5,10-15,17,18
1	310-001	1N4148	CR9
6	321-222	PN 2222	Q1-3,5,6,11
2	500-022	Pollyswitch	F1,2
2	312-965	15V 200 mw Zener 1N965 1N5245	CR7,8
4	311-004	1N4004	CR1-4
3	320-907	2N3638 plastic or PN2907	Q4,7,9
1	763-000	Surgejectors	S3
1	320-112	TIP-112 or MJE 270 Darlington	Q10
2	329-002	MOV 250 VAC	Z1,2
1	500-014	Reset button	SW1
1	600-008	Hybrid	T1
1	099-031	Transformer wall mount 8.5VAC	

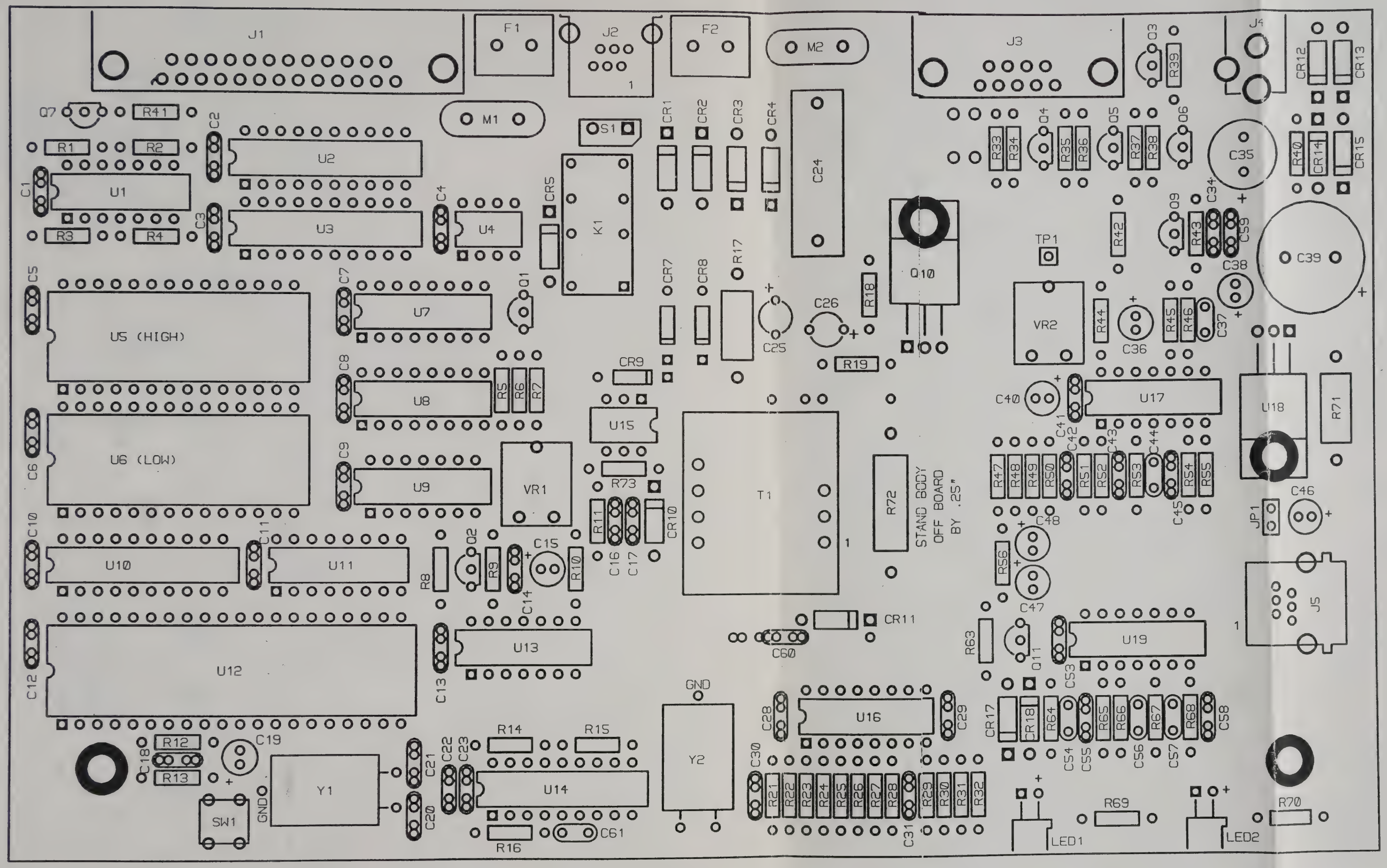


ADVANCED ELECTRONIC APPLICATIONS, INC.

PARTS PICTORIAL
HL-60 HAMLINK

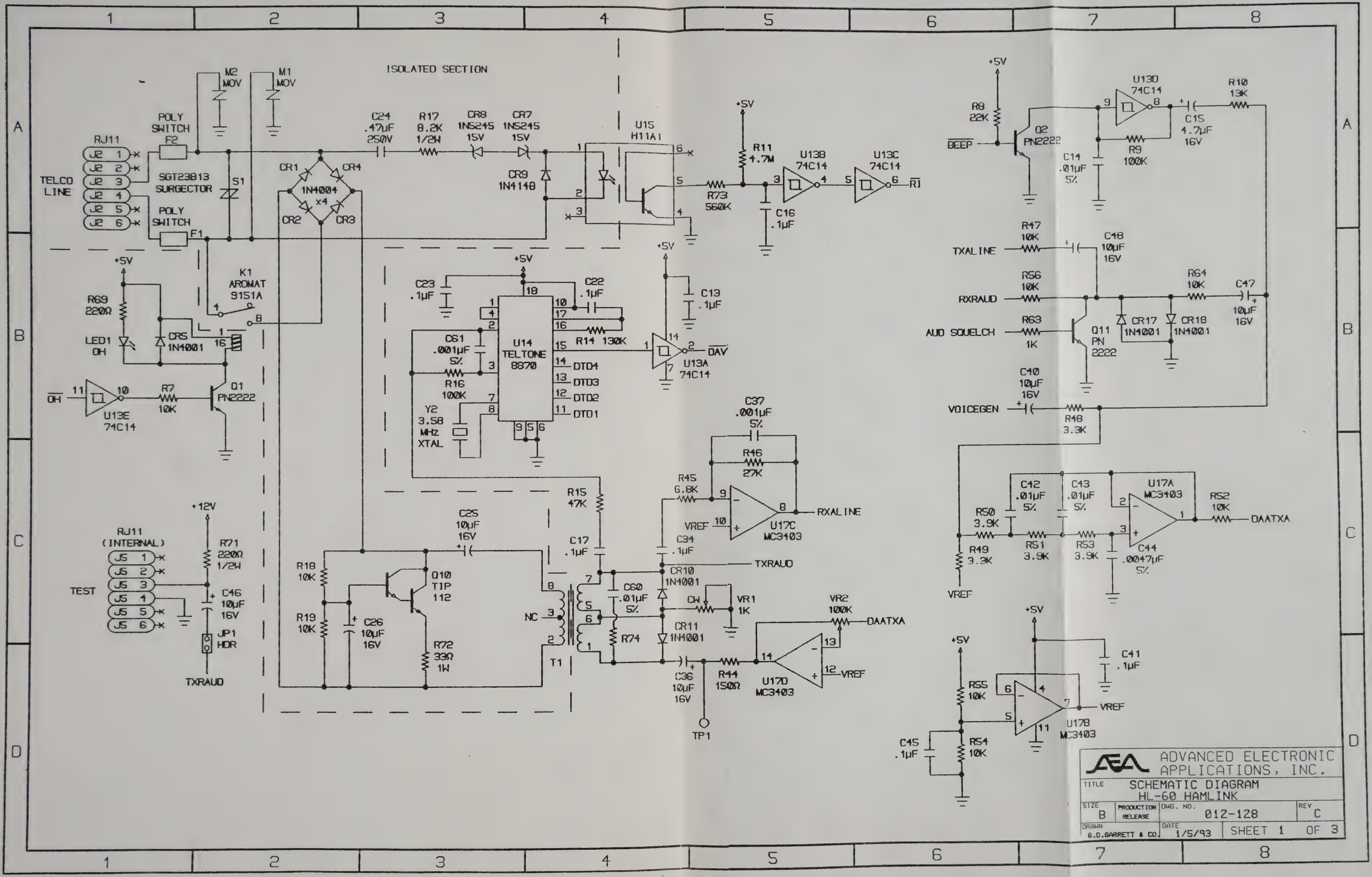
PRODUCTION RELEASE	DWG. NO. 011-128		REV C
RRETT & CO.	DATE 1/5/93	SHEET 1	OF 1

2	331-374-1	74HC374	U2,3
1	331-086-1	74HC86	U9
1	332-346	EEPROM	U4
2	330-403	MC 3403	U17,19
1	330-418	MC3418P CVSD	U16
1	041-160	LABEL HL-60 TELEPHONE	
1	013-128	PCB HL-60	
1	264-104-1	100K trim pot vertical adjust	VR2
1	264-102-5	1K trim pot vertical adjust	VR1
1	210-101	100 ohm 1/4W	R40
2	264-104-1	100K 1/4W	R9,16
20	210-103	10K 1/4W	R1-5,7,12,13,18,19,36,37,39,42,47,52,54-56,64
1	210-475	4.7M 1/4W	R11
1	210-273	27K 1/4W	R46
7	210-102	1K 1/4W	R23,24,29,32,35,43,63
1	210-133	13K 1/4W	R10
1	210-151	150 ohm 1/4W	R44
2	210-153	15K 1/4W	R27,28
1	210-275	2.7M 1/4W	R25
2	210-204	200K 1/4W	R30,31
1	210-203	20K 1/4W	R21
1	210-221	220 ohm 1/4W	R69
1	220-221	220 ohm 1/2W 5%	R71
6	210-223	22K 1/4W	R6,8,33,34,38,41
3	210-332	3.3K 1/4W	R22,48,49
2	210-511	510 ohm 1/4W	R26,70
5	210-682	6.8K 1/4W	R45,65-68
3	210-392	3.9K 1/4W	R50,51,53
1	210-134	130K 1/4W 5%	R14
1	220-822	8.2K 1/2W	R17
1	210-564	560K 1/4W 5%	R73
1	230-330	33 ohm 1 watt	R72
1	210-473	47K 1/4W 5%	R15
1	510-019	Relay DPDT	K1
9	311-001	1N4001	CR5,10-15,17,18
1	310-001	1N4148	CR9
6	321-222	PN 2222	Q1-3,5,6,11
2	500-022	Pollyswitch	F1,2
2	312-965	15V 200 mw Zener 1N965 1N5245	CR7,8
4	311-004	1N4004	CR1-4
3	320-907	2N3638 plastic or PN2907	Q4,7,9
1	763-000	Surgejectors	S3
1	320-112	TIP-112 or MJE 270 Darlington	Q10
2	329-002	MOV 250 VAC	Z1,2
1	500-014	Reset button	SW1
1	600-008	Hybrid	T1
1	099-031	Transformer wall mount 8.5VAC	



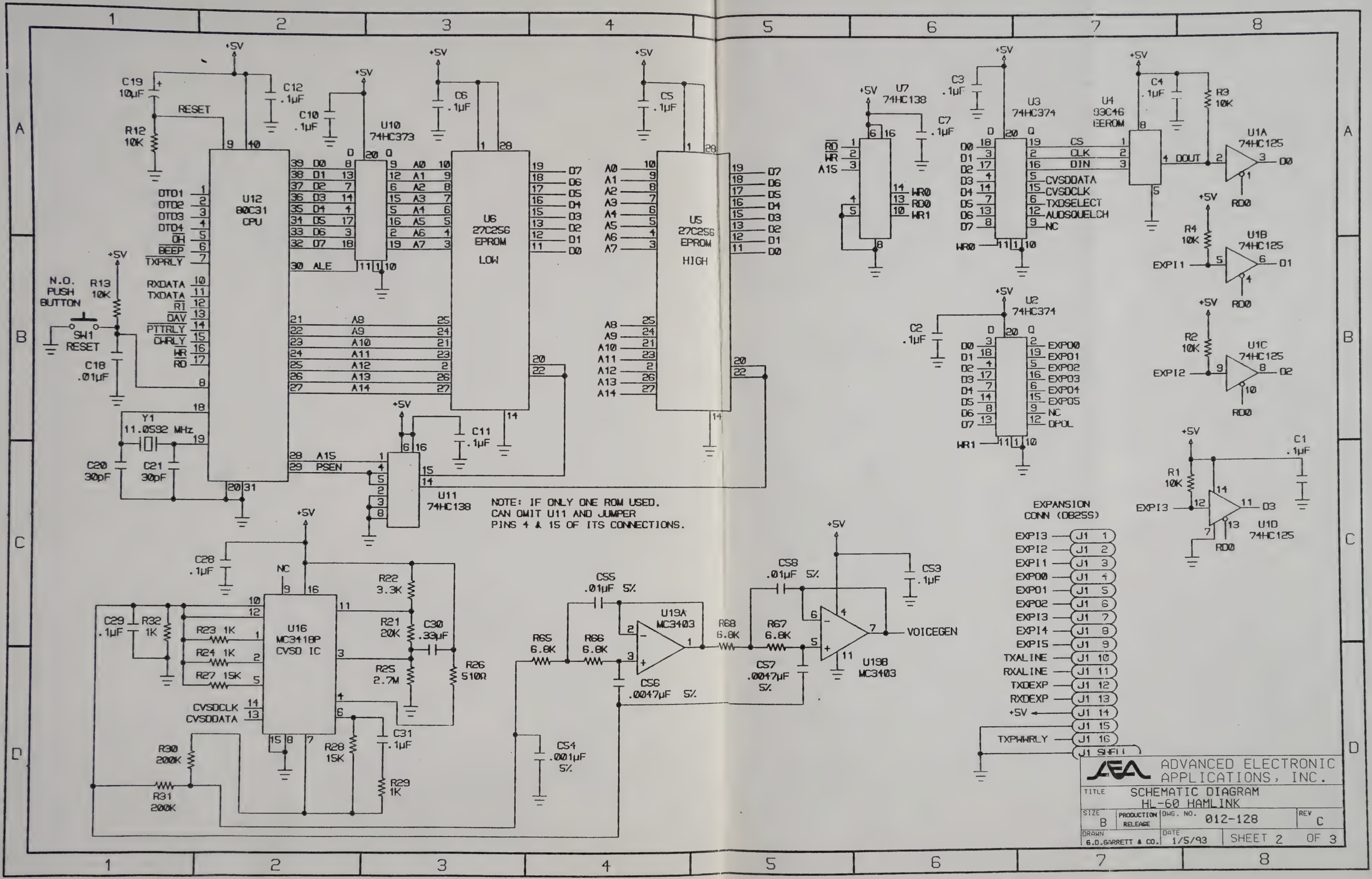
ADVANCED ELECTRONIC
APPLICATIONS, INC.

TITLE	PARTS PICTORIAL HL-60 HAMLINK		
SIZE B	PRODUCTION RELEASE	DWG. NO. 011-128	REV C
DRAWN G.D.GARRETT & CO.	DATE 1/5/93	SHEET 1	OF 1



AEA ADVANCED ELECTRONIC APPLICATIONS, INC.

TITLE	SCHEMATIC DIAGRAM HL-60 HAMLINK		
SIZE B	PRODUCTION RELEASE	DWG. NO. 012-128	REV C
DRAWN G.D.GARRETT & CO.	DATE 1/5/93	SHEET 1	OF 3



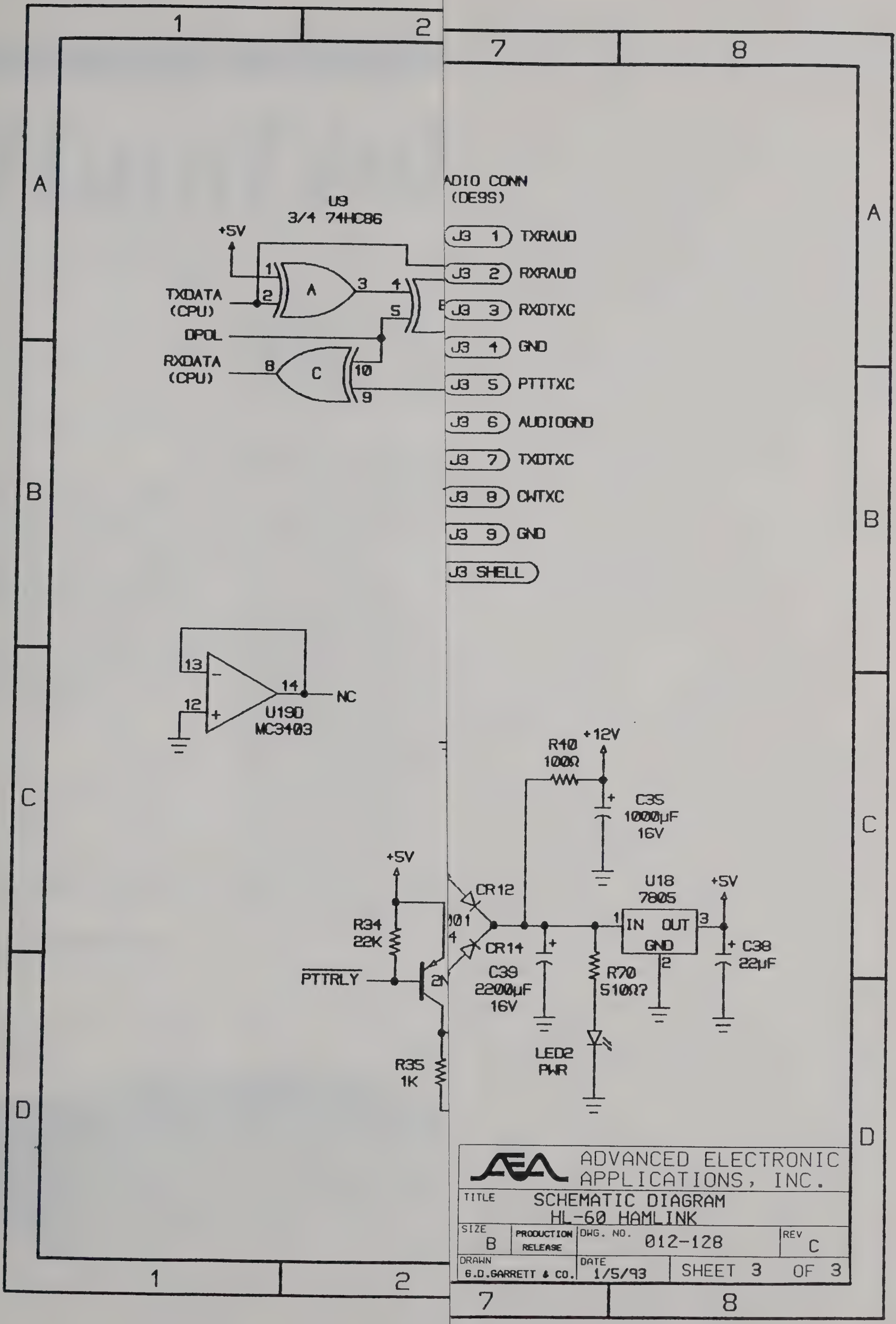
NOTE: IF ONLY ONE ROM USED.
CAN OMIT U11 AND JUMPER
PINS 4 & 15 OF ITS CONNECTIONS.

ADVANCED ELECTRONIC
APPLICATIONS, INC.

TITLE SCHEMATIC DIAGRAM
HL-60 HAMLINK

SIZE B | PRODUCTION RELEASE | DWG. NO. 012-128 | REV C

DRAWN G.D.GARRETT & CO. | DATE 1/5/93 | SHEET 2 OF 3

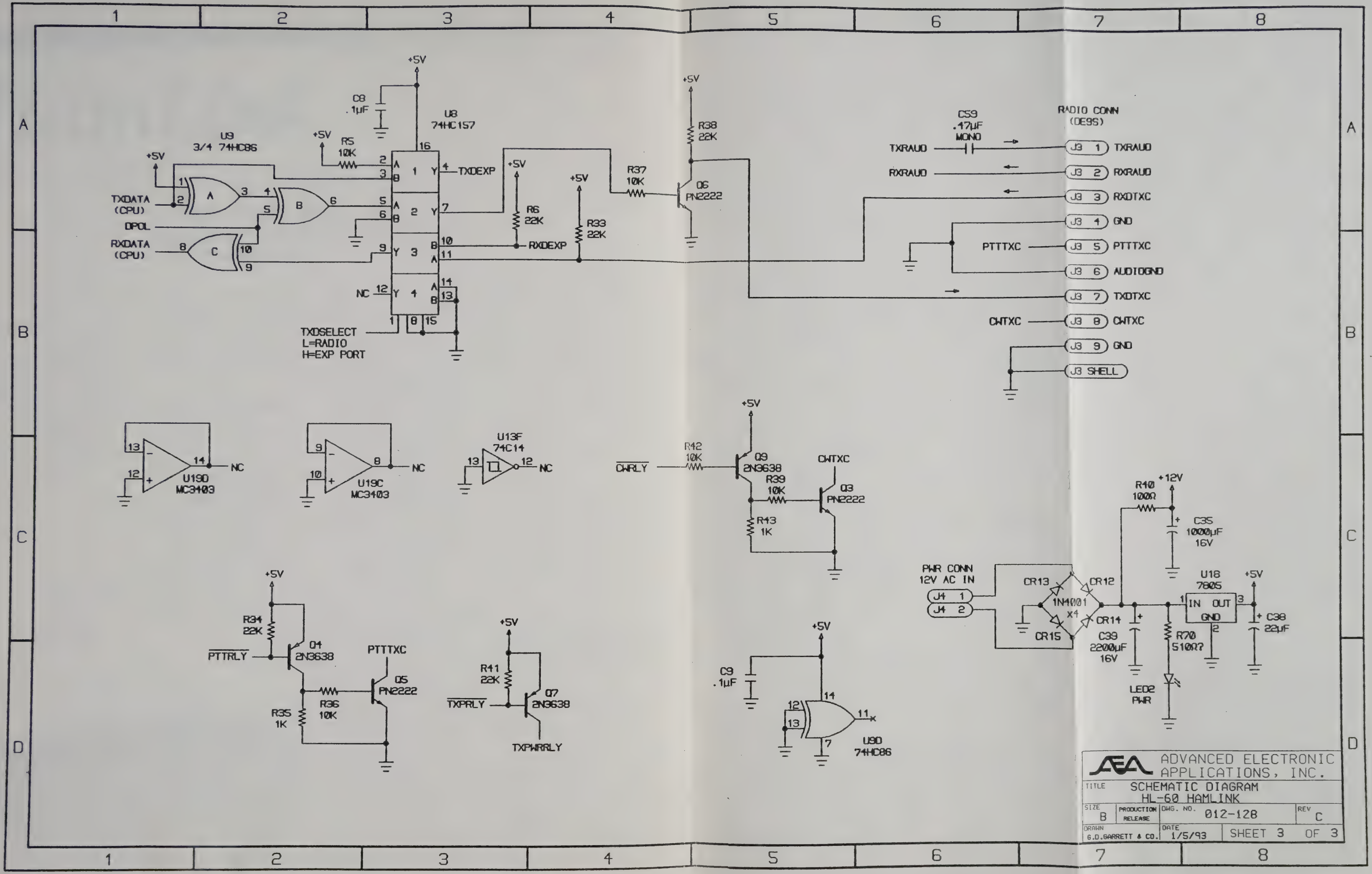


ADVANCED ELECTRONIC
APPLICATIONS, INC.

TITLE SCHEMATIC DIAGRAM
HL-60 HAMLINK

SIZE B | PRODUCTION RELEASE | DWG. NO. 012-128 | REV C

DRAWN G.D.GARRETT & CO. | DATE 1/5/93 | SHEET 3 OF 3



ADVANCED ELECTRONIC APPLICATIONS, INC.

TITLE SCHEMATIC DIAGRAM
HL-60 HAMLINK

SIZE	PRODUCTION RELEASE	DWG. NO.	REV
B		012-128	C
DRAWN G.D.GARRETT & CO.		DATE 1/5/93	SHEET 3 OF 3

Model HL-60

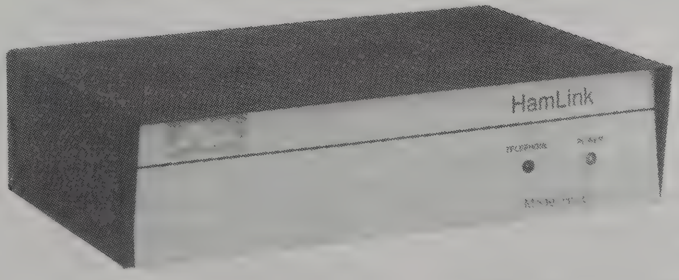
HamLink

ADVANCED ELECTRONIC APPLICATIONS, INC.

You can operate your ham station from anywhere in the world using a Touch Tone™ telephone!

Once or twice in a decade, an Amateur Radio product comes along that is so unusual – so unique that it has no competition. HamLink is just such a product. Contact your favorite local dealer for more information.

(Touch Tone–trademark of AT&T)



Model HL-60 ***HamLink***

Picture this—a friend calls Joe Ham at his office. The DXpedition from Kneecap Island has just come on 20 meters.

After thanking his friend, Joe dials his home telephone number, punches the Touch Tone pad a few times and suddenly 4Q2AB, operating from Kneecap Island, is heard in the handset. Joe says "4Q2AB/ K7RIE—5-9" a couple of times into the mouthpiece. Then he smiles, and hangs up the telephone, knowing that he has just worked rare Kneecap Island—country number 319 on his DXCC.

*How? Joe had an ARE **HamLink** installed on his rig.*

With it, Joe can control virtually any function of a ham rig (which is able to be controlled by a serial computer interface port) from any TouchTone telephone–anywhere in the world! ***HamLink*** users never miss a schedule, net check- in or a new country. They can even "rag-chew" or call CQ with their home rig, over the telephone line.

HamLink is contained in a 8"X5"X2" box which sits alongside your rig. It connects to the microphone, external speaker, CW key, and serial port jacks of an Icom, Kenwood or Yaesu transceiver. ***HamLink*** also connects to your existing telephone line – there is no need to add a second phone line. ***HamLink*** will function perfectly even if you also have an answering machine connected to the same telephone line.

*How? **HamLink** has built-in "smarts" and knows that it is you calling!*

Once the connection is made, you must enter your secret access code. This prevents unwanted people from accessing your equipment. If the code is correct, you hear a beep and the signals on the frequency to which the equipment was left tuned. By the way, you can connect an external relay to ***HamLink*** to control the AC power to your station.

Others can use your station, too.

If you give your secret code to friends, they can access your station in the same manner. If you have friends who live in a condo, where antennas are

Continued on Page 2, Col. 1

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QUESTIONS WE'VE BEEN ASKED 2
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TELEPHONE KEYPAD TUNING 3
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not permitted, or who cannot have a powerful station, you can let them use your equipment when you are at work. DX clubs can create "mega-stations" that club members can use for chasing those rare ones. We even know of a ham who is buying a small lot outside of town to put up an antenna and tall tower. He will access it via the phone line from his condo.

Controlling your radio is easy.

Once you log on to your ***HamLink***, you use the Touch Tone pad on the phone to control your radio. You can change bands and frequency, switch modes (AM/SSB/FM/CW), scan, run split VFO or virtually any other feature that your radio is capable of. Incidentally, ***HamLink*** also works on computer controlled receivers, like the Icom R-7000, for remote monitoring.

The "star" key controls the transmitter. On SSB, pressing this key once causes the transmitter to activate just like a push-to-talk button. When transmitting you simply speak into the telephone mouthpiece. When you are done speaking, you again press the "star" key, which deactivates the transmitter. You hear the receiver audio coming back to you.

You can even send full break-in CW over the phone line! If you switch to CW mode, the "star" becomes a telegraph key! You may not break any CW records, but it will allow you to snag that "rare one" who operates CW and only comes on while you are at work.

HAMLINK

Q&A

We've received hundreds of calls and letters with questions on ***HamLink***. They are probably similar to questions you may have.

*Can I use **HamLink** with a radio that does not have a computer control port?*

Absolutely. HamLink can be used with any radio. The logic outputs on HamLink can even be used to control a radio with no computer interface for a user skilled enough to interface them.

Can I make the interface cable?

Sure. We supply optional cables for Icom, Kenwood, or Yaesu (see list), in case you don't have the time or facilities to make one. But if you are a "builder," the diagram for all three cables is included in the manual.

*Will **HamLink** work with my radio?*

Does your rig have a CI-V input (Icom) or an active computer port (Kenwood and Yaesu)? If so, **HamLink** will control it. We've tested it with almost all Icom radios and it works fine. Same for Kenwood. Check with us if you operate a Yaesu. They use different control codes on various rigs. **HamLink** works with the FT-890, 990, 1000, 747GX and 757GXII. We may have added others by the time you read this.

Can I send high-speed CW from the office?

You bet! We make an optional CW adapter that connects to your remote telephone. You can plug a keyer into the adapter and send CW up to 50 WPM over the phone line. The adapter also has a headphone jack and provision to use a Yaesu YH-2 or Icom HS-10 headset-mic.

How can I actually tune the radio remotely?

If you know what frequency and band you want to operate on, you simply enter this on the telephone keypad (see control codes on page 3). But you can also tune up and down the band at various rates (see keypad drawing). You can scan preset memories or frequencies.

What if I lose track of the frequency?

That's easy! Press #91# and you hear a digitized voice telling you to what frequency the radio is tuned. Forget the mode? Press #93# for both frequency and mode. And it's not one of those voices that sound like a robot. It's the voice of our engineer and we pack him in every box!

What about adjusting volume?

Manufacturers do not make provision for controlling volume via the computer serial port on most radios. You will have to preset the volume to a normal level for your telephone line. The same is true for the microphone gain although the ALC will prevent you from overmodulating the radio. By the way, the instruction manual tells you how to set up the audio levels for your installation.

Can I work split frequencies for DXpeditions?

You bet! Look at the command structure on page 3. You have total control over VFO A and B. You can set them to any frequency to cover any situation.

*I'll bet **HamLink** can't control my antenna.*

You lose! There is an accessory output for controlling external relays. You can wire these outputs to turn your antenna or run the tower up and down.

What else can I do with the accessory outputs?

Use your imagination! The outputs control relays. What can you do with relays? There is even an output that pulses high for 100 mS.

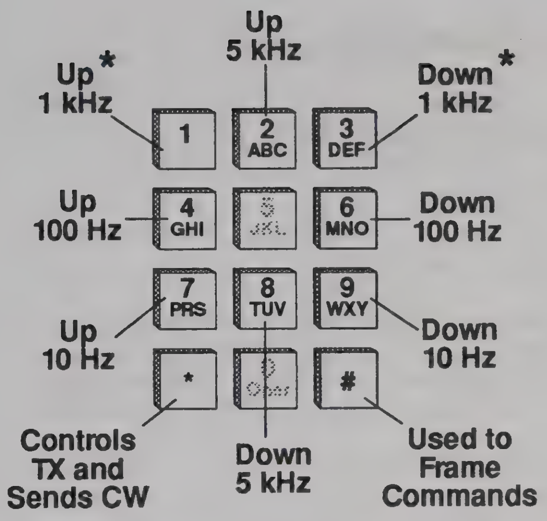
Doesn't this type of product require FCC type acceptance?

Anything that connects to a telephone line must be approved under Part 68 of the FCC Rules and Regulations to insure it will not damage the telephone network. Also, a product with a CPU must meet Part 15 to insure it does not radiate interfernce. ***HamLink*** meets both of these government requirments and is type accepted by the FCC.

Command Structure For *HamLink*

The following is a list of commands for *HamLink*. Note that all commands (other than those for frequency) are framed with a #.

#11#	Set mode to LSB (default)
#12#	Set mode to USB
#13#	Set mode to AM
#14#	Set mode to CW
#15#	Set mode to RTTY (see note 1)
#16#	Set mode to narrow FM
#17#	Set mode to wide FM
#2nnnn#	Set current VFO
#2nnnn*nn#	Set current VFO (see note 2)
#31#	Select VFO A
#32#	Select VFO B
#33#	VFO Always A = B
#34#	*VFO A & B Set Independently*
#35#	Set VFO B = VFO A
#51#	Select memory mode
#52#	Select VFO mode (default)
#53nn#	Select memory channel number
#55#	Start scan (in memory or VFO mode)
#59nn#	Set max. num. memory chns. to NN
#6n#	*Turns logic lines on and off*
#88n#	*Waiting time before hangup (n = minutes, 0 = infinity) without receiving Touch Tone input.*
#89n#	*Set phone answer mode* *0 = normal mode* 1 = answer on first ring *2 = answer on 2nd ring etc. up to 9 rings*
#91#	Announce frequency information
#92#	Announce mode information
#93#	Announce both freq. and mode info.
#94#	Announce VFO B freq. information
#0#	Hang up (also turns power relay off)
note 1-	use not recommended
note 2-	This command sets the current VFO to the specified frequency. The frequency is expressed in kilohertz. There must be at least four digits after the 2 key in the command string and before the ending # key. The frequency entry may contain a decimal point and Hertz resolution using the * key after the kilohertz entry.
note 3-	Commands in italics are not operative on demonstration unit.



* Scans memory in memory mode

Test HamLink ForYourself

Advanced Electronic Applications, Inc. has set up a demonstration *HamLink* that you can access. We've also established a dedicated phone line connected to the unit. You are invited to call (206) 880-6050 and put *HamLink* through its paces.

We have disabled the transmitter since we have no idea of who will be calling the demonstration. The disabled features are shown in italics in the command list.

When the phone answers, and you hear four beeps, enter the "secret" code 1234. You will then hear an announcement of the frequency and mode on which *HamLink* was left. Once *HamLink* accepts the code, you will hear the receiver in your earphone. Refer to the command list and test our unit. Don't stay on too long as there are many others who would like to access *HamLink*.

Change to the band and/or frequency you want to monitor, using the #2nnnn# command. Use the keypad commands above to vary the VFO up or down in frequency.

Note that when the command is not framed with the pound sign (#), *HamLink* knows that it is a frequency control command. You can move up in frequency 1 kHz by depressing the "1" key by itself, for example.

You will note from the listing that the pound sign key(#) proceeds and follows each command, other than up/down frequency control. If *HamLink* receives the tones indicating #, it knows that the numbers following represent a specific command. When *HamLink* sees a second # it knows that is the end of the command string and it should act on the command. A single beep means the command is acceptable. Three short beeps means *HamLink* does not understand the command. If the command is not proceeded by a pound sign, *HamLink* knows this is an up/down frequency control command.

Specifications

Power- 117 VAC or 8.5 to 13 VDC
Temperature- 0 to 35 degrees C
Size- 8" (W) x 5" (D) x 2" (H)
Weight- 2 pounds

Radio Interface

Any Icom HF, VHF, UHF, or receiver with a CI-V computer port. (Optional computer interface not required)

Any Kenwood HF, VHF, UHF, or receiver with an active computer port. (Optional IS-232 interface not required)

Yaesu FT890, FT-990, FT-1000, FT-747GX, FT-757GXII. (Optional computer interface not required)

Software Initialization by Owner

Password- Any 4-digit code
Answer Mode- Answering mode or number of rings before answer

Additional Specifications

Indicators- Power, Phone line off hook
Adjustments- None

Specifications subject to change without notice or obligation.

Equipment and Accessories

HL-60 HamLink

Options

OP-80
Op Link- Allows the use of a headset / boom mic or just plain headsets. A keyer, bug or straight key can be plugged in, allowing high-speed CW to be sent.

HL-61
ICOM Cable- Allows any radio with a CI-V computer port to directly plug into ***HamLink.***

HL-62
Kenwood Cable- Allows any radio with the computer port to directly plug into ***HamLink.***

HL-63
Yaesu Cable- Allows FT-890, FT-990, FT1000, FT-747GX, and FT-757GXII to directly plug into ***HamLink.***

Advanced Electronic Applications, Inc.
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1994 AEA Catalog

Model PK-900
THRESHOLD
POWER
HF ANALYST
KK-1 Keyboard Keyer
18:12
11JN93 19A-4 01081 23261 CC1
INV:0 REV:0 LPM:[576] IOC:[576] STATE:RUNNING TOP:2260 BOTTOM:1100 A_GREYS

Data Controllers

Software

Antennas

Antenna Analyzers

Remote Control

Keyers

an unfaltering dedication to all of amateur radio

A Message From Our President, Rod Proctor

Seventeen years ago, AEA was founded with one purpose in mind: to offer breakthrough technology to amateur operators worldwide.

Our mission remains unchanged. We are committed to producing superior amateur radio products built on the premise that engineering makes a difference. The results speak for themselves—AEA has grown into a multimillion dollar company by serving the needs of the amateur radio community.

To say we are dedicated radio operators is an understatement. With over 340 years of licensed amateur experience, our staff has a unique perspective on the needs of our fellow amateur radio enthusiasts.

Our IsoLoop 10-30 antenna is an excellent example of our dedication to amateur radio operators. We became aware that a growing number of amateurs were facing antenna restrictions and that many amateurs live in apartments and condominiums, where space for installing antennas is limited. Immediately, we set out to develop an antenna that had the performance of a big antenna without the size. We accomplished this with the IsoLoop 10-30—a 35" loop antenna with low-angle performance better than many full-size HF antennas.

Yet another example is found in our SWR-121 Antenna Analysts. Before the SWR-121, this sort of equipment was large, usually not portable, and difficult to use. Our search for an alternative to the cumbersome and confusing analyzers of old led us to develop a pair of antenna analysts that are completely portable, easy-to-use, and less expensive than many of the alternatives.

We're not just committed to providing the best technology—we're dedicated to providing the best overall experience. Our $1,000 Amateur Ambassador Award is just one way we use to promote amateur radio. The award is intended to recognize amateurs who promote amateur radio to those outside the hobby.

Each year, one amateur radio operator is picked from the many nominations we receive. Nominees are judged on their dedication to amateur radio, the influence they've had on those outside amateur radio, and any special activities that promote amateur radio. Last year's Amateur Ambassador, Catharine Gunderson of Santa Cruz, CA, spearheaded a program that enabled the youngsters in her area to talk to astronauts on the Space Shuttle *Endeavor*. If you would like to make a nomination for this year's award, drop us a line at the address on the back cover.

Our dedication spans the distance between the technology and the people of amateur radio. It's a great hobby, and we here at AEA are doing everything we can to keep it going strong.

Here's hoping you enjoy the hobby as much as we enjoy providing more ways to enjoy it.

73,

Rod Proctor

Rod Proctor, N7UDD
President

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data controllers

Data Controllers From AEA ... Anything Else is Old News

Today's amateur radio operators communicate in many different ways. One of the more popular methods is digital communications. The first signals sent in amateur radio were in Morse code, a form of digital communications. Another early method of communication was RTTY. RTTY is still popular, though the computer has replaced the teletype terminal, with all of its mechanical wonders. Since computers play an important role in our everyday lives, it is hardly surprising that people with computers might want to talk to other people with computers.

In late 1970's, the amateur radio community modified the communication system used by ships to come up with AMTOR (AMateur Telegraph Over Radio), which allowed worldwide error-free communication. A similar thing happened when a group of Canadian amateurs modified a particular networking protocol and created the first packet radio protocol, starting a revolution in digital communications.

One of the most common modes is packet radio. Packet radio is a low-cost way to send and receive messages on a worldwide basis. You can communicate keyboard-to-keyboard, use a personal mailbox, access Internet, or send and receive DX spotting information on a DX cluster. Packet radio doesn't require a wealth of knowledge about computers or amateur radio and the cost of getting set up with a packet radio station is very reasonable. As a matter of fact, if you own a home computer and a VHF transceiver you have two of the three necessary ingredients to get started in packet radio. What's left? A data controller from AEA.

AEA has been the technology leader in data controllers from the very start. Currently, there are seven high-quality AEA data controllers to choose from.

A good place to get started is with one of our packet-only data controllers, the PK-88 and the new PK-96. The PK-88 is perfect for the budget-minded amateur just looking to get their feet wet. Our newest data controller, the PK-96, lets you communicate with the state-of-the-art 9600 baud stations coming on line.

If you're interested in working digital modes other than packet, our line of multi-mode controllers are your best bet. Our best selling multi-mode controller, the PK-232MBX, is the best way to get a low-cost, high performance data controller that can decipher what you can't hear.

The future is in DSP-based (Digital Signal Processing) data controllers. AEA has been designing and manufacturing the DSP-2232/1232 for three years. It is the most sophisticated data controller available for amateur use today.

Multi-Mode Product Comparison Chart

	DSP-2232/1232	PK-900	PK-232
Dual port	●/○	●	○
Pactor/packet/AMTOR MailDrop	●	●	●
B&W fax	●	●	●
9600 bps	●	◐	○
PSK satellite modems	●	○	○
State machine DCD	○	●	○
19,200 TBAUD	●	●	○
Memory ARQ	●	●	●
LCD readout	●	●	○
External reset button	●	●	○
Separate AFSK controls	●/○	●	○
Digital signal processing	●	○	○

● = Yes ○ = No ◐ = Option

Every day AEA's engineers are designing new products and new features for existing products. Not only have we pioneered hardware, but we have also helped bring new protocols, like PACTOR, to amateur radio operators. We have also developed a complete line of software that makes communications easier and more fun.

Buying an AEA product is an investment in the future because we bring you the break throughs.

DSP-2232 & DSP-1232

Advanced Electronic Applications, Inc
DSP-2232
POWER
TUNE
DSP Digital Signal Processor
Multi-Mode Data Controller
DSP-1232
Advanced Electronic Applications, Inc
TUNE
POWER
Multi-Mode Data Controller
DSP Digital Signal Processor

Exceptional Data Controllers for Amateurs Who Demand The Best

Take a fast trip to the future with these digital signal processing multi-mode data controllers! The DSP-1232 with two switchable ports, and the DSP-2232 with two simultaneous ports, provide a new level of performance and versatility in data controllers. The capabilities of both are endless.

Providing a new level of performance and versatility. An incoming analog signal is digitized by a 12-bit, high speed, analog-to-digital converter. The digitized data is then digitally filtered and analyzed by a Motorola 56001 computer running at 24 MHz. The processed demodulated signals are then passed to a second processor, the Hitachi 64180, for protocol conversion. One great advantage of the DSP is that new modems or modes only require new software; unlike an analog modem which usually requires that new hardware be installed.

The dual port capabilities of the DSP-2232 let you take full advantage of Gateway. Your DSP-2232 now has a capability never before offered in a multi-mode controller: the ability to create a "gateway" from packet-to-AMTOR, packet-to-PACTOR, and of course, packet-to-packet. Since you have dual simultaneous radio ports, the DSP-2232 allows cross-mode gateway operation. Under your command, you can allow packet users connecting to Port 2, the ability to monitor and link to other AMTOR, PACTOR, or even packet stations using your HF radio on Port 1.

The dual ports of the DSP-2232 also offer you simultaneous HF and VHF monitoring, or running two

continued on page 6

Specifications for the DSP-2232 and the DSP-1232

Demodulator	Motorola 56001 Digital Signal Processor running at 24 MHz
Modulator	Phase continuous sinewave, AFSK generator
Modulator output level	5-100 mV RMS, adjustable with side-panel controls
Processor system	Hitachi 64180
RAM	64K Lithium battery-backed
ROM	Up to 384K (128K dedicated to DSP)
Hardware HDLC	Zilog 8530 SCC
Power requirements	+13 VDC (+12 to +16 VDC) @ 1.1A
Input/Output Connections	
Radio interface	Two 5-pin DIN connectors. Simultaneous operation on the DSP-2232, software selectable on the DSP-1232
Direct FSK outputs	Normal/Reverse
CW keying output	+100 VDC @ 100 mA max or -30 VDC @ 20 mA max
Terminal interface	RS-232-C DB-9P connector with hardware/software handshake
Terminal data rates	Autobaud settings at 300, 600, 1200, 2400, 4800, 9600, and 19,200 bps
Printer interface	IBM compatible 25-pin bi-directional parallel port (DB-25 connector)
Physical	
Dimensions	12" (305mm)W x 9.8" (249mm)D x 2.9" (73.7mm)H
Weight	3 lbs, 12 oz (1.7 kg)

DSP-2232 & DSP-1232 continued from page 5

On the Leading Edge of the Amateur Radio Frontier

VHF packet radios at the same time. You can also listen to your local DX node while working AMTOR on an HF frequency.

Internal software provides all popular digital amateur data modes, including PACTOR. As new modes become available, all you need are replacement EPROMs. Satellite and all PK-232MBX modems are available, plus the K9NG and G3RUH compatible 9600 bps modems. Any desired FSK tone pair can be programmed for the DSP units, as well as QPSK or other specialized modems. The DSP multi-mode data controllers are the most versatile on the market.

Automatic Doppler correction. Up/down Doppler shift for PSK modems, outputs for up/down frequency stepping to control the radio's frequency.

The onboard 9600 baud modem gives you even more power. Having 9600 baud capability lets you bounce packets off satellites and communicate with terrestrial stations at a blazing rate of speed!

PACTOR opens up a universe of capabilities. The potential of this new mode is practically limitless! Specific benefits include automatic speed selection (100 or 200 bps), error-free data, transmission memory ARQ, personal MailDrop, and ASCII data compression.

Other important benefits:

- Unique LCD read-out on the DSP-2232 displays the mode and diagnostics for both channels, giving you more information than LEDs can.
- On packet, the LCD diplays the call signs of stations heard. On RTTY, AMTOR, and PACTOR text received on the air is displayed.
- Upgradeable flexibility for the DSP-1232 allows you to upgrade to a full-featured DSP-2232 with the LCD display at any time.

Everything that makes the PK-232MBX such a success is included in both DSP units. You get the latest version of MailDrop with selective control of third-party traffic and bulletin board system (BBS) compatibility so messages can be automatically forwarded. Also included is the host mode preferred by professional programmers for efficient control of TNCs. In packet, the DSP is compatible with the TCP/IP networking protocol. This requires the data controller to recognize special commands not found on all controllers, such as KISS, PERSISTENCE, and SLOTTIME.

Modes and Modems for the DSP-1232 and the DSP-2232

Modes	
Send and receive	ASCII, AMTOR (ARQ & FEC), Baudot, Fax (2-color), Morse code, Packet (AX.25 and KISS), PACTOR
Receive only	Signal Identification, AMTOR ARQ Listen, Bit-inverted Baudot RTTY, NAVTEX, TDM, 250 gray shade fax, PACTOR Listen
Modems	
Port 1	RTTY/TOR 170: 2125/2295, RTTY/TOR 170: 1445/1275, RTTY/TOR 425: 2125/2250, RTTY/TOR 850: 2125/2975, RTTY/TOR 200: PACTOR 2110/2310, RTTY/TOR 200: PACTOR 1460/1260, Packet 300 bps HF 2110/2310, Packet 300 bps HF 1460/1260, Packet 1200 bps VHF, Packet 1200 bps PACSAT, Packet 1200 bps PSK, Packet 2400 bps V.26B, Packet 4800 bps PACSAT, Packet 4800 bps PSK, Packet 9600 bps FSK K9NG/G3RUH, Packet 4800 bps PSK, Morse 750 Hz, Analog Fax HF, Analog Fax APT, Analog SSTV, DSP data 400 bps OSCAR-13, RTTY/TOR 1200 bps ASCII OSCAR-11, DSP data spectrum, Packet 1200 bps MSK, Packet 2400 bps MSK
Port 2	Packet 200 bps HF 2110/2310, Packet 1200 bps VHF, Packet 1200 bps PACSAT, Packet 2400 bps V.26B, Packet 9600 bps FSK K9NG/G3RUH, DSP data 400 bps OSCAR-13, Packet 1200 bps MSK, Packet 2400 bps MSK
Dual port	RTTY/TOR 170: 2125/2295; Packet 300 bps HF 2110/2310 RTTY/TOR 170: 2125/2295; Packet 1200 bps VHF RTTY/TOR 200: PACTOR 2110/2310; Packet 300 bps HF 2110/2310 Packet 300 bps HF 2110/2310; Packet 1200 bps VHF RTTY/TOR 200: PACTOR 2110/2310; Packet 1200 bps VHF Packet 1200 bps VHF; Packet 1200 bps VHF

For fax printing, most parallel printers can be connected to the DSP or your computer. With the right software, you can print HF monitored fax signals. The DSP supports most printing standards.

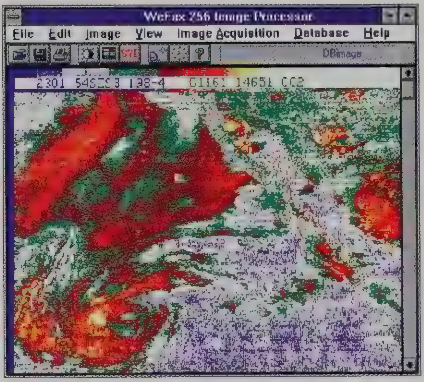
DSP controllers will decode Time Division Multiplex (TDM) signals. TDM is a mode resembleing FEC AMTOR used in commercial applications. TDM uses one sub-carrier, but assigns separate data channels to different time slots.

accessories for the DSP-2232/1232

AEA WeFax 256

This new Windows Program for WEFAX display features:

- Displays, in real time, true grayscale images from either the NOAA HF WeFax Service or the NOAA APT Satellite Service.
- Provides two modes of resolution—500 or 250 pixels per line—which insure that the AEA WeFax 256 Imaging System will work on your system. In addition to the real-time display mode, all incoming data is stored in a buffer, giving you the ability to obtain a higher resolution.
- Incorporates a scrollable receive buffer capable of operating in either stop or loop modes.
- Includes a complete Image Processor, giving the user the ability to enhance received images to bring out areas of interest. Enhancements include brightness, contrast, gamma, sharpness, negative, blur, false color, and many more.
- Supports BMP, GIF, PCX, TIF, and JPG image formats.
- Integrates an Auto Clock function to "wake up" your system; captures unattended transmissions.



A sample screen from AEA WeFax 256 demonstrating some of the available enhancements.

Requirements: An AEA DSP-1232 or DSP-2232 Multi-mode Data Controller with a receiver and antenna system for either HF, APT VHF or microwave operation. A 386 PC-compatible computer or better, 2 MB of RAM (4 MB highly recommended), 5 MB of free hard disk space (more required if you wish to save images). VGA 256-color monitor and video card or better. Windows 3.1.

ST-1 Satellite Tracker

New for the satellite operator! Hardware and software for automatic tracking of satellites. Hands–off control of antennas and transceiver tuning make satellite operation easy. As the satellite nears the horizon, the antennas are pointed in the proper direction and the rig is tuned to the right uplink and down-link frequencies. As the satellite moves into the field of view, the antennas track and the transceiver tuning is corrected for the Doppler shift throughout the pass.

Features:

- Automatically controls Yaesu 5400/5600 Azimuth-Elevation rotors. The ST-1 can be used with two independent rotors as well. Has A/D converters, precision power supply, and relays to control two independent rotors.
- Works with InstantTrack, QuickTrack and RealTrack software.
- Tunes FT-736, TS-790, IC-970 and the IC-475/275 combination transceivers. Does not require external RS-232 adapters.
- Provides initial tuning and Doppler correction during satellite pass.
- Hardware uses one serial port and parallel port from the host computer. Automatic switching provides easy access to serial and parallel port when ST-1 isn't in use.
- Requires an IBM PC-compatible computer capable of running InstantTrack, QuickTrack or RealTrack and 13.6 VDC @ 1A.

PK-900 Multi-Mode Controller

A Data Controller for Amateurs Serious About Exploring the Digital Frontier

The next generation of our American-made multi-mode data controllers is here. When you're ready to step up beyond our popular PK-232MBX multi-mode controller, the PK-900 is it. Its performance is comparable to units costing hundreds...even thousands of dollars more. From a capability standpoint, the PK-900 is positioned between the PK-232MBX and the DSP-2232, exhibiting features found on both. With the PK-900, there are no compromises: It has established a new benchmark in performance, with all the modes and features of the PK-232MBX and a good deal more.

Dual simultaneous ports. Switch between radio ports with a keystroke and still receive simultaneous signals from both ports. The days of hitting Radio 1/Radio 2 to switch back and forth—limiting you to one conversation at a time—are over.

Internal firmware includes SIAM™— Signal Identification & Acquisition Mode. SIAM automatically identifies incoming Baudot, ASCII, AMTOR/SITOR, PACTOR, and TDM signals, and with a few keystrokes switches to the recognized mode and starts the data display.

Specifications for the PK-900

Demodulator	Port 1: 8-pole Chebyshev bandpass filter, 4-pole discriminator, 5-pole post-detection low pass filter. Port 2: AMD 7910 Modem
Modulator	Programmable phase continuous sinewave, AFSK generator
Modulator output level	5-100 mV RMS
Processor system	Hitachi 64180, Motorola 68HC05B4, Motorola 68HC05C4
RAM	64K Lithium battery-backed
ROM	Up to 256K
Hardware HDLC	Zilog 8530 SCC
Power requirements	+12 to +16 VDC @ 1.1A
Input/Output Connections	
Radio interface	Two 5-pin DIN connectors
Direct FSK outputs	Normal/Reverse
CW keying output	+100 VDC @ 100 mA max or -30 VDC @ 20 mA
Terminal interface	RS-232-C 25-pin DB-25 connector with hardware/software handshake
Terminal data rates	Autobaud settings at 300, 600, 1200, 2400, 4800, 9600, and 19,200 bps
Printer interface	IBM compatible 25-pin bi-directional parallel port (DB-25 connector)
Physical	
Dimensions	11.8" (300mm)W x 12" (305mm)D x 3.5" (89mm)H
Weight	6 lbs, 4 oz (2.84 kg)

Optional 9600 baud modem board gives you more power. This easy-to-install board makes "getting up to speed" easy. Bounce packets off satellites or communicate with terrestrial stations at a blazing 9600 baud. The PK-900 uses three dedicated processors and an innovative circuit design to give it the power and flexibility you want from a multi-mode controller that will serve you into the future.

High-performance bandpass filter limiter discriminator gives you excellent filtering on channel 1. The 8-pole Chebyshev bandpass filter offers six software selectable tone shifts—170 to 1000 Hz. The 6-pole, post detection linear phase low pass filter is optimized for data rates from 45 to 2000 baud.

Unique LCD display tells you everything at a glance. The large,

Any Way You Look At It, The PK-900 is a Revolution in Data Controller Technology

easy-to-read backlit display provides all essential status and mode information for both ports. A 20-segment multi-mode bar graph makes HF tuning easy. This display even informs you of new mail!

All standard features needed for digital amateur radio operation are included: PACTOR, Packet, AMTOR, ASCII, Baudot, Morse, B&W Fax trnasmission and reception, as well as ARQE3, NAVTEX, TDM, 16-level gray scale fax (with optional software), and signal identification when you're scanning the bands. 17K dynamically allocated packet and AMTOR MailDrop, Packet Lite for enhanced HF operation, and host mode for superior software support. Interface connection for AFSK, direct FSK, direct CW keying, tuning scope, plus selectable State Machine PLL or in-band energy level DCD. Also features a test mode for easy troubleshooting. The new ARXTOR command allows for automatic detection of AMTOR or PACTOR signals, identifying which type of signal it is and switching your PK-900 to that mode.

Change the way you communicate with Gateway! Not only does the PK-900 feature all the fine capabilities detailed above—now you have a capability never before offered in a multi-mode controller: the ability to “gateway” from packet to AMTOR, packet to PACTOR, and of course, packet to packet. Under your command, you can allow packet users connecting to Port 2 the ability to monitor and link to other AMTOR, PACTOR, and even packet stations using your HF radio on Port 1.

Gateway as a Node. Your Gateway firmware will support local acknowledgment *(acks)* of packets like a full-service node does, so instead of users having to digipeat through your MYALIAS or MYCALL call sign to connect to a destination station, they can now simply connect to your MYGATE call sign. From there, they can issue a connect request to the station they want to reach and your station will be responsible for accepting and sending packet data and acks.

Twenty software selectable modems. There are optimized modems for AMTOR, PACTOR, 45 baud teletype, and packet. There is even a disconnect header, so you can plug in your own modem. Modem selection is as easy as typing a command for the one you want. For a full listing of available modems, see below.

Modems: *Port 1:* FSK 45 bps 170 Hz, FSK 100 bps 170 Hz, FSK 45 bps 200 Hz, FSK 100 bps 200 Hz, FSK 100 bps 425 Hz, FSK 100 bps 850 Hz, Analog, Fax, FSK 300 bps 200 Hz, FSK 1200 bps 1000 Hz, Morse. *Port 2:* HF Packet, VHF Packet, Internal option for 9600 baud, and Modem disconnect header.

Accessories for your PK-900:

For truly cutting-edge digital operation, consider these products:

IsoLoop 10-30HF Antenna Page 18
A small loop antenna with big antenna performance. Great for amateurs with limited space.

PC-PAKRATT for Windows Page 14
Windows software that makes it easier to use the full capabilities of your PK-900.

For the following options, call our upgrade hotline at (206) 774-1722:

AEA FAX II 900 Option
Receives and displays fax signals in 16 shades of gray.

9600 Baud Option

Work satellites or terrestrial stations at 9600 baud.

PK-232MBX Multi-Mode Controller

The Largest Selling Multi-Mode Data Controller in the World

This data controller combines all of the popular amateur data communication modes into just one unit; with over 65,000 sold worldwide, operators know they have found a winner!

Modes include: Morse Code, Baudot, ASCII, AMTOR/SITOR 476 and 625, PACTOR, HF & VHF Packet, B&W FAX receive/transmit, NAVTEX/AMTEX/ARRL information services.

Gateway as a Node. Your Gateway firmware will support local acknowledgement *(acks)* of packets like a full-service node does, so instead of digipeating through your MYALIAS or MYCALL call sign to connect to a destination station, simply connect to the MYGATE call sign.

Designed specifically for multi-mode operation...it's not just a packet controller with extra firmware. Its internal modem can transceive packet at rates from 45 to 1200 baud (2400 bps optional), with the option of using an external modem for higher baud rates. Also features a no-nonsense VHF/HF/CW modem with an 8-pole Chebyshev bandpass filter, followed by a limiter-discriminator with automatic threshold correction. The modem can copy shifts from 85 to 1500 Hz in two ranges.

Internal software includes SIAM™— Signal Identification & Acquisition Mode. SIAM automatically identifies incoming Baudot, ASCII, AMTOR/SITOR, PACTOR, and TDM signals, and with a few keystrokes switches to the recognized mode and starts the data display.

Standard 18K MailDrop with selective control of third party traffic. It uses a subset of popular W0RLI/WA7MBL commands, including List Mine, Kill Mine, Read Mine, Edit, Help, etc. Your local BBS can automatically forward and reverse-forward messages to and from your station. The PK-232MBX can be used as the data controller "front end" with most popular BBS programs.

Efficient control with host mode designed to allow easy programming of powerful programs. In packet, the PK-232MBX internal program is compatible with the popular TCP/IP networking protocol via KISS mode.

Included: RS-232 shielded cable, two radio cables, and all rear panel mating connectors. Optional AC-4 power supply and pre-made radio cables available.

Specifications for the PK-232MBX

Demodulator	8-pole Chebyshev bandpass filter, limiter, 4-pole discriminator, 5-pole post-detection low-pass filter
Modulator	Phase continuous sinewave, AFSK generator
Modulator output level	5-200 mV RMS
Processor system	Zilog Z-80
RAM	32K Lithium battery-backed
ROM	128K
Hardware HDLC	Zilog 8530 SCC
Power requirements	+12 to +16 VDC @ 850 mA (1A recommended)
Input/Output Connections	
Radio interface	Two 5-pin connectors, front panel selectable
Direct FSK outputs	Normal/Reverse
Scope outputs	Mark, space
CW keying outputs	+100 VDC @ 200 mA max and –25 VDC @ 30 mA max
Terminal interface	RS-232-C 25-pin DB-25 connector with hardware/software handshake
Terminal data rates	Autobaud settings at 300, 600, 1200, 2400, 4800, and 9600 bps
Printer interface	Centronics parallel printer output with optional cable
Physical	
Dimensions	11" (279mm)W x 8.25" (210mm)D x 2.5" (64mm)H
Weight	3 lbs (1.35 kg)

PK-96 Packet Controller

A High Speed Packet Controller With the Speed You Need

Tired of waiting for packet data? Wish for an easy solution? Now there is one: the PK-96, a cost-effective, high-speed, single-mode data controller.

When what you need is speed, you need the PK-96. You will no longer have to purchase a data controller and add a high-speed modem upgrade just to do 9600 baud packet! Our PK-96 1200/9600 baud packet controller comes standard with 1200 baud AFSK tone signaling, as well as 9600 baud K9NG and G3RUH compatible direct frequency modulation, making it a truly high-performance data controller! The PK-96 not only makes an excellent terrestrial or satellite data controller, it also can be used for high-speed data links between packet systems.

Full-featured mail facilities. In addition to the speed, the PK-96 comes standard with 18K of battery-backed MailDrop memory which is easily expanded to 110K, as well as the command set you've come to enjoy from our products. MailDrop allows you to automatically receive and reverse-forward messages and control third-party traffic.

Extra commands add extra value, extra control. In addition to our famous HOST mode, special commands not found in all data controllers are included in the PK-96. Some of these include KISS, PERSISTENCE, and SLOTTIME.

Other features include:

- Hardware "true DCD" state machine for open squelch operation.
- Hardware HDLC controller guarantees accurate protocol conversion at 9600 baud.
- Modem disconnect header for installing other modems.
- Separate 1200/9600 TX level controls.
- Enhanced MHEARD function identifies TCP/IP, NET/ROM, and <TheNet> stations.
- EXPERT command included to ease the learning process—only the most popular commands will be executable until the EXPERT mode is enabled.
- Small size—more room on your bench for other equipment!

If you're serious about packet radio, the PK-96 is the obvious choice. As a data controller, the PK-96 allows you to communicate on existing 1200 baud packet systems as well as communicating with the new 9600 baud systems coming on line. As a high-speed link, the PK-96 eliminates system bottlenecks and therefore increases system capacity.

Specifications for the PK-96

Demodulator	Texas Instruments TCM-3105 1200/G3RUH and K9NG compatible 9600
Modulator	Phase continuous AFSK 1200/9600 bps direct FSK
Modulator output level	5 mV-1 V RMS rear panel adjustable
Processor system	Hitachi 64180
RAM	32K standard, expandable to 128K
ROM	64K maximum
Hardware HDLC	Zilog Z8530
Power requirements	+12 to +16 VDC @ 400 mA
Input/Output Connections	
Radio interface	5-pin DIN connector
Terminal interface	RS-232C DB-25 connector with hardware/software handshake
Terminal data rates	Autobaud settings at 300, 600, 1200,2400, 4800, 9600, and 19,200 bps
Physical	
Dimensions	6.13" (156mm)W x 7.4" (188mm)D x 1.35" (34mm)H
Weight	1.2 lbs (0.54 kg)

PK-88 Packet Controller

Looking for a data controller with proven, superior packet performance? Connect with our popular PK-88 HF/VHF packet-only data controller!

Ideal for those just getting started, as well as stepping up. The PK-88 is ideal for the amateur who is looking to get started in digital communications. Yet, because of its superior features, the PK-88 has the sophistication for those amateur radio operators looking to take their hobby one step further.

Unique features make the PK-88 more versatile. The PK-88 combines AEA's unique host mode with enhanced KISS capability to provide compatibility with TCP/IP and G8BPQ networking software. There is also a special version of NET/ROM* firmware available. These capabilities allow you to turn your PK-88 into an ISO layer 3 and 4 network node.

Enjoy MailDrop, an extremely efficient 18K personal mailbox with selectable third-party traffic. When your PK-88 is active, other stations can connect to you and exchange personal messages, traffic, or bulletins. MailDrop accepts inbound mail forwarding and supports reverse forwarding to your local W0RLI/WA7MBL/AA4RE/MSYS auto-forwarding packet BBS. The PK-88's internal lithium battery will hold the MailDrop contents when the unit is off.

Besides standard TNC features, you also get these exceptional bonuses:

- **Packet Dump Suppression** prevents dumping unsent packets if the link fails.
- **Prioritized Acknowledgment (ACKPRIOR) Protocol** improves performance on busy channels.
- **Custom Command** allows additional PK-88 customization for non-standard applications.
- **Exclusive CFROM and DFROM Commands** to permit selective connecting and digipeating—accept or reject digipeater operation or connection to your station by call signs.

PCB-88

All the features of the PK-88 to plug into an 8- or 16-bit expansion slot on your PC-compatible computer. It has a true DCD circuit built in, along with a standard modem disconnect header, allowing for easy hook up of external modems, for high-speed, PSK, etc. In addition, the PCB-88 includes the PC-Pakratt 88 host mode program for easy control.

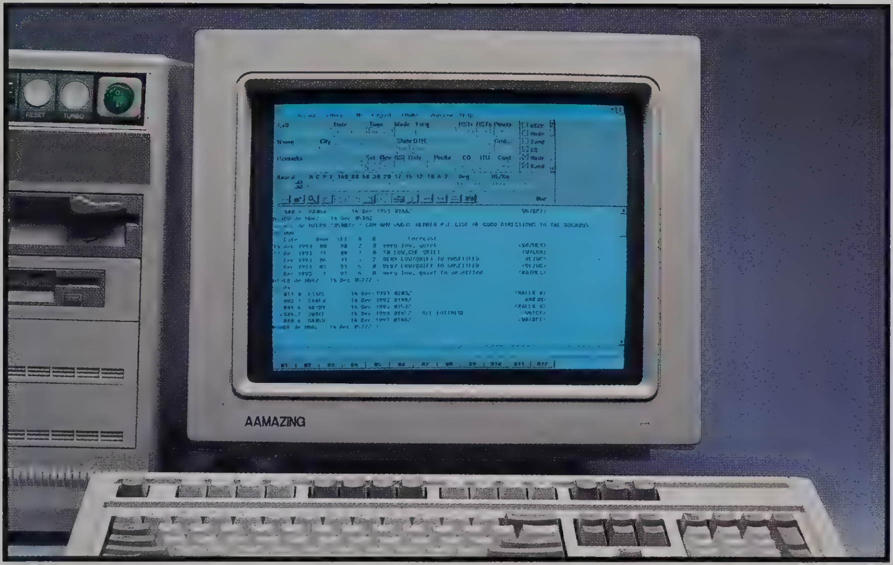
The included (US only) 12VDC adapter allows the MailDrop to receive messages, even when the computer is off. All necessary instructions and cables are included.

Specifications for the PK-88	
Demodulator	AMD-7910 world modem chip
Modulator	Phase continuous sinewave, AFSK generator
Modulator output level	5-300 mV RMS
Processor system	Zilog Z-80
RAM	32K, Lithium battery-backed
ROM	32K
Hardware HDLC	Zilog 8530 SCC
Power requirements	+12 to +16 VDC @ 550 mA
Input/Output Connections	
Radio interface	Locking 8-pin mic connector
Terminal interface	RS-232-C 25-pin DB-25 connector with hardware/software handshake
Terminal data rates	Autobaud settings at 300, 600, 1200, 2400, 4800, and 9600 bps
Physical	
Dimensions	7.5" (191mm)W x 6.1" (152mm)D x 1.5" (38mm)H
Weight	2 lbs, 5 oz (1.1 kg)

Specifications for the PCB-88 (same as PK-88 with the following differences)	
Power requirements	Internal computer power or +12 to +16 VDC @ 375 mA
Input/Output Connections	
Radio interface	DB-9 9-pin connector
Computer interface	IBM-PC compatible (ISA Bus) internal card
Physical	
Dimensions	9.75" (248mm)W x 4.9" (124mm)D x .9" (23mm)H
Weight	9 oz (0.25 kg)

* © Software 2000

Log Windows™



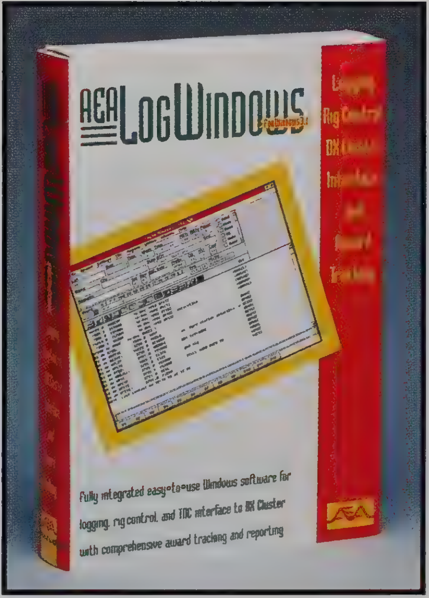
A Fully Integrated Easy-To-Use Windows Program to Simplify Almost Everything You Do!

Log Windows™ is a fully integrated, easy-to-use Windows program. It combines the functions of logging, rig control, and DX Cluster monitoring with award tracking and reporting. The award tracking functions will keep you up-to-date on your progress toward various awards. Importing information from other logging programs is easy—move data from your favorite contest program or previous logging program into the Log Windows database without a hitch!

Features include:

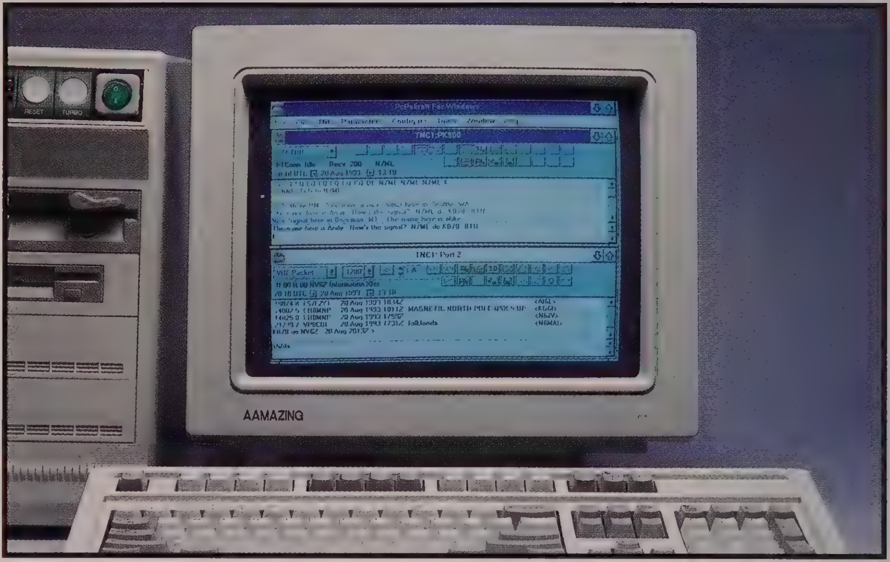
- Logging, rig control (ICOM, Kenwood, and newer Yaesu radios), and data controller interface in one integrated application. Radio QSY and QSX via DX Spots.
- Comprehensive database for storage of QSO information.
- Powerful reporting and search capabilities for the data contained in your on-line logbooks—no more flipping through your logbook!
- Packet Cluster interface supports any data controller in dumb terminal mode. Seven hundred line scrollable buffer. MCI DX Alert (DX in CW). Mouse-based Spot grabbing.
- Award Types: DXCC mixed, phone, CW, FSK, bands; CQ mixed, SSB CW FXK, bands; WAS mixed, SSB, CW, FSK, bands.
- Report Types: Summary, Full report, Countries/states/zones worked, Countries/states/zones needed, QSLs sent, QSLs needed, Award tag types (not tagged/duplicates).
- Record Searching Modes: Call sign, prefix, QTH, state, grid, exact match, sequential, wildcard, and record number.
- Print logbook (chronological or sorted by prefix) or print QSO labels.
- Import data from major logging programs, such as CT, Easy-DX, Hyperlog, LogMaster, DXBase. Moving to Log Windows is a breeze!
- Export data to an ASCII File for use in other applications.
- Interfaces to SAM and Buckmaster on-line callbooks for automatic display of name and QTH when call sign is entered.

Requirements: Windows 3.1, 4 MB of RAM, VGA display. A mouse is recommended. Supports data controllers connected to COM1-COM4 (Optional) and/or Radio Serial Port connected to COM1-COM4 (Optional).


AEA LogWindows
Logging
Rig Control
DX Cluster
Interface
and
Award
Tracking
Fully integrated easy-to-use Windows software for logging, rig control, and TNC interface to DX Cluster with comprehensive award tracking and reporting
AEA

PC-PAKRATT for Windows

PC-PAKRATT for Windows Makes Taking Control of Your AEA Data Controller Easier & More Enjoyable!



AEA knows that good software can make all the difference in whether you find your hobby a pleasure or a tedious chore. PC-PAKRATT for Windows has been designed with this in mind.

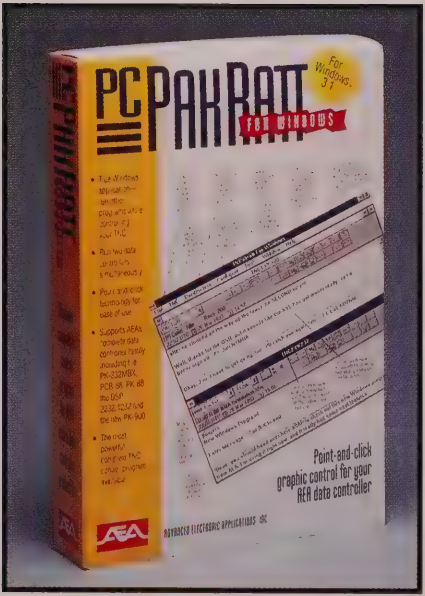
PC-PAKRATT for Windows is a true Windows application, allowing you to run other programs while controlling your data controller. Windows also provides you with terrific features like cut & paste, background execution, multi-tasking, etc. The graphical user interface makes the program functions quick and easy to access.

The entire family of AEA data controllers are supported by PC-PAKRATT for Windows! It has all the features that amateurs operating digital modes have asked for, such as the ability to run two data controllers at the same time.

Run two data controllers at once! Using Windows' multi-tasking abilities, you can have dual-, tri-, or even quad-port operation with two full-featured AEA data controllers. Imagine working an AMTOR DX station through your PK-232MBX, receiving information from a local packet net on your PK-900's port 2, and working PACTOR on port 1 of the PK-900, all at the same time! Or, use your PK-900 and DSP-2232 for four simultaneous ports!

Separate parameter files mean setting up your TNC once and forgetting it. Parameter changes are easy with the complete parameter windows, and each mode has a different parameter set, allowing each controller's setup to be easily optimized for each mode.

More exciting features! Other features include separate windows for mailbox operation, QSO logging, file transfers, full control of screen colors, and more. And, of course, PC-PAKRATT for Windows contains a comprehensive Help section to explain everything—from parameter definitions to how to run a dual-port controller.


PC PAKRATT
FOR WINDOWS
For Windows 3.1
Point-and-click graphic control for your AEA data controller
AEA
ADVANCED ELECTRONIC APPLICATIONS INC

Supports all AEA Data Controllers. PC-PAKRATT for Windows supports AEA's complete line of data controllers, including the PK-88, PCB-88, PK-96, PK-232MBX, PK-900, DSP-1232, and DSP-2232.

Requirements: Windows 3.1, 4 MB of free hard disk storage space, and 2 MB RAM (4 MB recommended).

Data Controller Software for your Macintosh,™ Commodore,™ or DOS-based Computer

PC-PAKRATT for DOS

Designed for PC-compatible computers and all AEA data controllers.

PC-PAKRATT II 5.5, is a split-screen terminal program for operation of Morse code, baudot, ASCII, AMTOR, PACTOR, NAVTEX, and packet.

Among its many features:

- Friendly on-screen one-touch Help menu to define commands and parameters for all modes.
- Full QSO logging feature.
- Nine hundred line scroll-back buffer stores incoming data.
- Five message/command buffers allow pre-programming of messages or commands for transmission with a single keystroke.
- Includes PK-FAX, a black & white fax display program.
- Complete macro key facility.
- PK-EDIT for editing message files.

Specifications: Requires minimum of 512K RAM and DOS 3.0. Supports COM 1-4. Provides mouse support.

MacRATT with Fax

Version 2.1 for Macintosh computers. Makes using AEA's Data Controllers as easy as clicking the mouse! Supports PK-232MBX and PK-88.

PC-PAKRATT 88

A lower-cost version of PC-PAKRATT II specifically for the PK-88. Most features of PC-PAKRATT II are included, but RTTY, FAX, AMTOR, etc., support have been removed since the PK-88 is a packet-only TNC.

COM-PAKRATT with Fax

For the Commodore 64 computer. Supports the PK-88 and the PK-232MBX. Supplied on two ROM plug-in cartridges and includes an RS-232 level converter.

Pakratt Software Selection Table

	PC-PAKRATT for Windows	**PC-PAKRATT II**	**PC-PAKRATT 88**	**COM-PAKRATT**	**MacRATT**
Which controllers*	All	PK/PCB-88, PK-232MBX	PK/PCB-88	PK-88, PK-232MBX	PK-88, PK-232MBX
Computer type	PC Compatible	PC Compatible	PC Compatible	Commodore C-64	Macintosh
PACTOR	●**	●**			
Fax	●***	●***		●	●
Binary file transfer	●	●	●		●
Disk & printer access	●	●	●	●	●
Help	●	●	●		

* "All" denotes PK-96, PK-88, PCB-88, PK-232, PK-900, DSP-1232, and DSP-2232.

** Requires AEA multi-mode controller with PACTOR.

*** Includes DOS-based PK-FAX, B&W fax receive & transmit program. Works with multi-mode controllers only.

● = Yes ○ = No

AEA FAX II

Tired of Waiting for the Weather Reports on Television?

AEA FAX II is a multi-shade, gray scale fax receiving system for your PC-compatible computer. With a VGA monitor, up to sixteen shades of gray are possible, enabling you to receive highly detailed gray scale images. EGA, CGA, and Hercules monochrome adapters and monitors are supported as well, but with fewer gray shades displayed.

In addition to weather charts, WEFAX images, and wire photos, you'll be able to receive and decode Morse code and RTTY transmissions. AEA FAX II also has the capability to receive and display NAVTEX transmissions—the teletext-style maritime information service. The program is menu driven and works with or without a mouse.

On-screen tuning indicator makes tuning the signal a breeze! This tuning indicator remains active even while receiving, which helps you keep the signals coming in clearly.

Keep track of your favorite stations. AEA FAX II also includes a fax station database where you can keep a log of stations heard. Once a station is in the database, you can quickly and easily search the entire database by names, country, or time.

Share your images with friends! We've included a function that will export your received images to PCX or GIF files so you can use the images in other applications, share images with friends who don't have AEA FAX II, or edit the images in your favorite photo-editing program.

Simple plug-in demodulator included. The circuitry for demodulation is housed in the included demodulator (pictured with box at left). A shielded audio cable plugs into a COM port on your computer and into your HF receiver's external speaker output. The connector has a female DB-25 connector on one side, to interface with your computer's COM 1-4 port; on the other side is a male DB-25 connector so you can "daisy chain" and avoid tying up a COM port.

AEA FAX II
FOR PC COMPATIBLES
Facsimile, Morse Code, RTTY, and NAVTEX Receiving System
System Requirements
A stand-alone, multi-intensity gray scale demodulator and display software package.

Other exciting features include automatic reception of images when you're away, support for most HP LaserJet- and Epson-compatible printers, and false color capabilities on an EGA monitor.

Requirements to run AEA FAX II. AEA FAX II requires a PC-compatible computer and a general coverage HF SSB receiver. VGA monitor required for gray scale fax display.

IsoPole™

The Maximum Gain Antenna with Patented Cone Decoupling

The IsoPole™ is available in 144, 220, or 440 MHz versions, each yielding the maximum gain attainable for their respective lengths as well as zero-degree angle of radiation.

Superior decoupling results in simple tuning and a significant reduction in TVI potential. There is less feedline pick-up of any computer hash noise with the IsoPole than with any equivalent antenna.

Cones offer greater efficiency over obsolete radials which radiate in the horizontal plane. Additionally, the IsoPole offers broad frequency coverage. There is no loss of power output from one end of the band to the other. When used with SWR-protected solid-state transceivers, you experience a typical SWR of 1.4:1 or better across the entire band. VHF versions include a 50 ohm SO-239 connector recessed within the base sleeve for full weather protection.

An impedance matching network designed for maximum legal power. It compensates for the impedance introduced by the SO-239 connector used in the VHF models.

The IsoPole offers superb strength to withstand the harshest environments. The insulating material offers excellent strength and dielectric properties plus superb long-term ultraviolet resistance. The mounting hardware is stainless steel and the decoupling cone and radiating element are made of corrosion-resistant aluminum alloys. The aerodynamic cones are the only appreciable windload and attach directly to your TV mast.

Specifications for the IsoPole

Model*:	Iso-144	Iso-220	Iso-440
Frequency coverage	135-160 MHz	210-230 MHz	415-465 MHz
Impedance	50 ohms	50 ohms	50 ohms
Nominal power rating	1.0 KW	1.0 KW	1.0 KW
2.1 VSWR bandwidth	10 MHz @ 146 MHz	15 MHz @ 220 MHz	22 MHz @ 435 MHz
Length	125.5" (3.2m)	79.25" (2m)	46" (1.2m)
Min. mast length**	8' (2.4m)	5.25' (1.6m)	6" (50mm)
Coax connector	S0-239	S0-239	Type N
Gain (on horizon)	3 dBd	3 dBd	3 dBd

* Aircraft band and commercial versions also available

** Mast not included.

HotRods

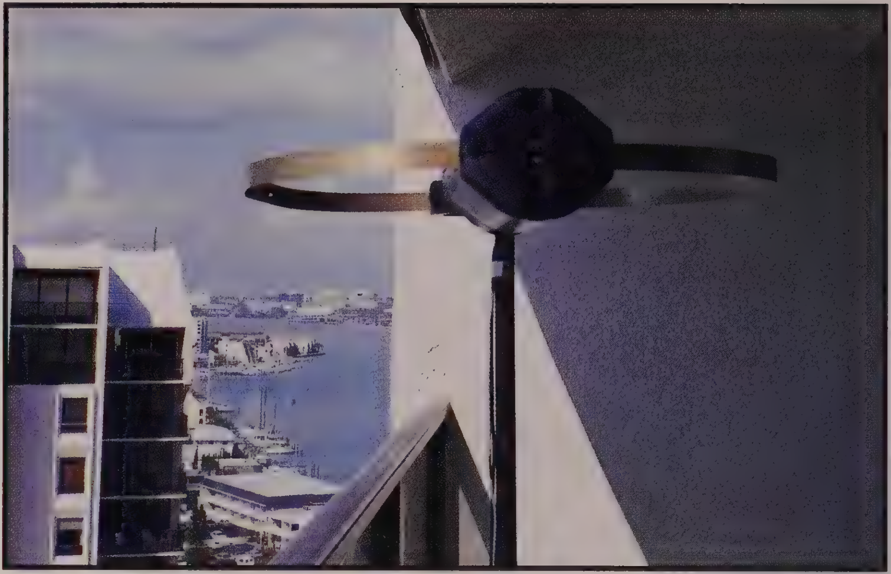
Get extended range and maximum gain with these high-performance telescoping handheld half-wave antennas. HotRods achieve higher gain than any 5/8 wave, two-meter telescopic antenna for handhelds.

The HR-1 is 20% shorter and lighter than a 5/8 wave antenna, which places less stress on your handheld's connector and case. It can handle over 25 watts of power, making it an ideal portable base or mobile antenna. Collapsed, the HotRods perform electrically like helical quarter-wave flexible antennas.

Two versions available: the HR-1 half-wave 2M, and the HR-2 half-wave 220 MHz.

IsoLoop 10-30 antenna

The Biggest Performance You Can Find in a Small Antenna!



This high-Q, high-efficiency antenna is perfect for amateurs living in areas with antenna restrictions! This antenna exhibits a significant engineering breakthrough with its high-performance, low-profile design. It covers 10-30 MHz continuously at 150 watts and makes it possible for hams to enjoy their hobby in what may seem to be an impossible location.

Superb engineering makes this antenna unique. The antenna is omnidirectional and requires no rotor or antenna tuner. It can be mounted horizontally or vertically. Horizontal mounting is preferred for best DX performance due to the lower angle of radiation at low heights. It also allows for easy attic installation. Mounting it vertically provides a null in a specified direction. The flexible, iridited aluminum loop band has a very low radiation resistance—ranging from 0.2 to 0.4 ohms!

Compact design great for amateurs in restricted areas. Operate your favorite band from areas with restrictive zoning ordinances! And the IsoLoop 10-30 can be easily compressed to squeeze through attic openings and other tight spaces in apartments and condos.

The antenna is highly efficient due to precise, heavy-duty construction and design standards. Efficiency ranges from 96% on 10 meters to 72% on 20 meters. The custom designed, split-stator capacitor has no rotating contacts and is rated at 10,000 volts. (A smaller capacitor would require a less efficient antenna design to prevent arcing.)

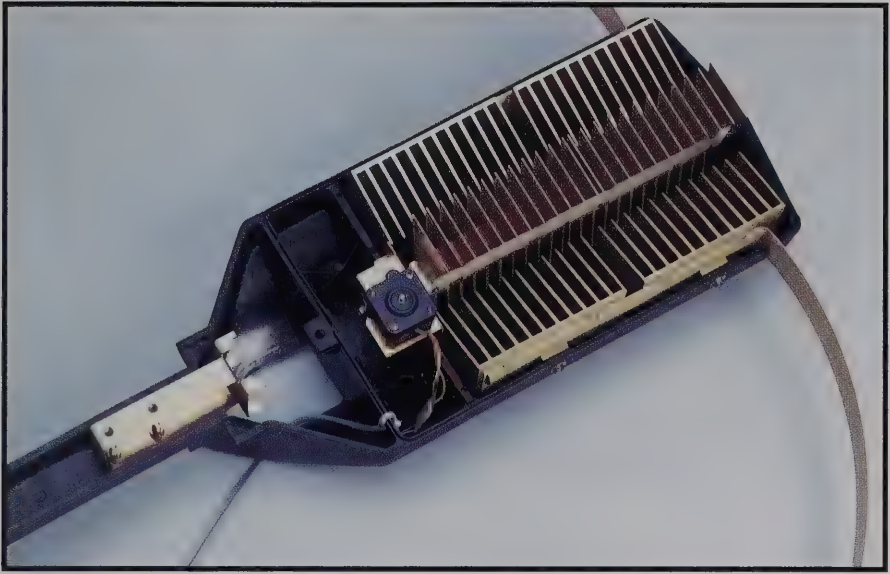
In addition, the high-Q design results in a narrow bandwidth which suppresses harmonics from your transmitter, reducing TVI problems. It also attenuates out-of-band signals, helping prevent receiver overload.

The capacitor is rotated by a low-noise precision stepper motor, so exact tuning is a breeze.

Specifications for the IsoLoop 10-30

Frequency coverage	10 to 30 MHz, continuous	
Nominal Impedance	50 ohms	
Power rating	150 watts	
VSWR	Less than 1.5:1 (no nearby obstructions)	
Temperature	Operating Storage	0 to 150°F (-17 to 65°C) -50 to 200°F (-45 to 93°C)
Dimensions	35" (89cm) diameter circle	
Max. mast diameter	2" (51mm)	
Weight	Actual: 14 lbs (6.35 kg)	Shipping: 25 lbs (11.34 kg)
Coax connector	UHF (S0-239)	
Gain over dipole	Depends on elevation	

Optional LC-2 shielded control cable with connectors available in 50' (15.25 M) and 100' (30.5 M) lengths.



From the Inside Out, the IsoLoop Proves That Size Doesn't Matter!

Getting on the air is a snap. The IsoLoop comes fully assembled, so getting on the air is just a matter of sliding the loop onto the mast,* tightening down the U-bolt, and attaching the coax.*

There are no complicated instructions or mechanical joints. All welded contruction means no mechanical joints, so the possibility of corrosion is kept to a minimum. The IsoLoop 10-30 is isolated from the feedline, resulting in an undistorted radiation pattern and less stray RF in the ham shack.

The IsoLoop 10-30 is compact, round, measures a scant 35" in diameter and weighs only 14 pounds. Because it comes fully assembled and operates on 13.8 VDC, it is the ideal antenna for Field Day and DXpeditioning. Use it on a boat, a mobile home, take it wherever you wish! It comes with an AC-1 power supply (US only), LC-2 tuner with frequency indicator, and a 50-foot shielded control cable.

The IsoLoop 10-30 includes 50 feet (15.25 M) of shielded control cable. Extension cables are available.

*Mast and coax cable not included.

IT-1 Automatic Tuner

With the IT-1 IsoTuner, tuning the IsoLoop 10-30 has just become easier! Tuning with the IT-1 typically takes just a few seconds.

Internal beeper confirms key pad operations and announces completion of tuning or error conditions

A thumbwheel knob provides manual control and fine tuning with the step rate determined by the speed of knob rotation. The IT-1 tunes for maximum receive noise or minimum SWR. Add to this eight programmable memories and a 10-segment multipurpose LED bar and the IT-1 becomes an indispensable part of your IsoLoop tuning system.

Memory back-up, built-in serial interface, and pop-up software included.

antenna analyzers

SWR-121 HF & SWR-121 V/U

Get a Grip on Your Antenna's Performance With the SWR-121 HF or SWR-121 V/U

Take the guesswork out of getting maximum antenna performance—use the SWR-121 VHF/UHF (120-175 MHz, 200-225 MHz, and 400-475 MHz) or the SWR-121 HF (1-32 MHz) Antenna Analyst. With a graphic display to show what's happening with your antenna's SWR vs. frequency, the SWR-121 Antenna Analysts help you maximize your investment in your amateur radio antennas.

The SWR-121 Antenna Analysts combine a microprocessor-controlled frequency synthesizer with an accurate low-power SWR bridge. A full-featured keypad allows you to select the center frequency, frequency range, and step size. The unique LCD readout displays the antenna's SWR curve over an entire range, not just at one frequency.

Use the analyzer anywhere—at a Field Day site, up the tower, or from your shack! Take this portable analyst with you next time you climb the tower. From there, plug your antenna directly into the SWR-121 and get a precise display of your antenna's SWR curve, independent of the feedline. Subsequently, make tuning adjustments and immediately see the results. There's even a handy carrying case available!

Testing coax has never been easier! Use your SWR-121 Antenna Analyst to measure the return/loss in dB in a length of coax. Now you will be certain it's time to replace that old feedline with fresh coax and new connectors.

Optional Software. With features like remote control of your SWR-121 and the ability to display plots on the computer, the optional AACOM software makes it easy for you to get the most from your hand-held Antenna Analyst. With AACOM you can:

- Save plots to disk and track antenna performance over time.
- Control an SWR-121 from a computer keyboard. (Interface cable included with AACOM.)

Specifications for the SWR-121 HF & SWR-121 V/U

	SWR-121 HF	**SWR-121 V/U**
Frequency ranges	1.0-31.999 MHz	120-175, 200-225, 400-475 MHz
Characteristic impedance	50/75 ohms, selectable	50 ohms
SWR measurement range	1:1 to 65.5:1	1:1 to 65.5:1
Return loss range	0.3 dB to 50 dB	0.3 dB to 50 dB
Frequency increments	1 kHz	10 kHz
Serial port	9600 baud, XON/XOFF handshake	9600 baud, XON/XOFF handshake
Accuracy	+/- 10% typical, below 10:1	+/- 10% typical, below 10:1
Display resolution	0 to 200 kHz per dot (1 kHz increments)	0 to 990 kHz per dot (10 kHz increments)
Harmonics & spurious	>30 dB below fundamental, typical	>30 dB below fundamental, typical
Display update time	Approximately 9 seconds/sweep	Approximately 2 seconds/sweep
Power requirements (identical for both units)	Internal Eight AA alkaline or high energy lithium batteries External 12-16 VDC	
Physical (identical for both units)		
Dimensions	4.3" (109mm)W x 8.5" (216mm)D x 2.25" (57mm)H	
Weight	1 lb, 10 oz (0.74kg)	

remote control

HamLink and RadioLink

Now You Can Operate Your Base Station From Just About Anywhere

No longer are you tied to your shack when you want the power of a base station. Now you can control your Icom, Kenwood, or Yaesu radio using a telephone, handheld, or mobile radio. Using your radio's computer port you can operate SSB, FM, AM, and even CW from your car, your office, on vacation—anywhere you go.

You can change bands, frequency, and modes with HamLink or RadioLink. Just in case you lose track of your frequency or mode, we've included a voice synthesizer to remind you. Plug-in cables make set-up a snap. Both units have outputs for controlling other accessories.

HamLink. HamLink controls your ham station using a touch-tone telephone. Change bands and frequency, tune up or down, switch modes (AM/SSB/FM/CW), scan, run split VFO, or virtually any other radio feature from anywhere you can find a touch-tone phone.

HamLink hooks into your existing telephone line so there is no need for a second phone line. HamLink functions perfectly even if you have an answering machine connected to the same phone line.

RadioLink. Similar to HamLink, RadioLink lets you use the touch-tone keypad on your handheld or mobile radio to change bands, frequency, or mode. RadioLink can go between your HF/VHF/UHF transceiver and a repeater or a 220 MHz or UHF full duplex link.

RadioLink also interfaces with equipment that does not have a computer port for commercial use. In addition, RadioLink can be switched to a local mode so that the user does not have to plug and unplug a local mic, key, and speaker.

OpLink

Used with HamLink, OpLink lets you plug in your favorite key or keyer and start transmitting high speed CW. Use a headset/boom mic combination or stereo headsets at the user end of the connection for great audio.

OpLink allows the use of the Icom HS-10 or Yaesu YH-2 headset boom microphone combination, allowing you to use a mic tailored for amateur use instead of the element in your telephone. OpLink also has a key jack so you can plug in your keyer, bug, or hand key to allow high speed CW.

keyers

KK-1 Keyboard Keyer

Get All Keyed Up with the New Keyboard Keyer from AEA

Put the world at your fingertips! If you enjoy operating CW, the KK-1 Keyboard Keyer literally puts the world at your fingertips. The KK-1 turns any standard PC-compatible 101-key keyboard into an easy-to-use, feature-packed Morse machine. If you already have a keyboard connected to your PC, the KK-1 will share it with your computer (cable provided), saving valuable operating space. A simple key combination switches the keyboard between the keyer and your computer.

Well thought-out controls. The KK-1's extensive features take full advantage of your keyboard's layout. For example, the separate numeric and cursor-control keypads are used for accessing the majority of functions and for parameter selection. The twelve function keys select the message buffers with a single keystroke.

A host of useful features. Unique features, such as short-term memory, message repeat, and nestable message buffers make the KK-1 versatile and easy to use. You can hone your skills with an extensive code practice mode which allows you to choose between words commonly heard on the air (over 700!) and random groups of selectable length and difficulty. A built-in iambic keyer allows you to use paddles for a change of pace, and the paddles can be easily inverted for right- or left-handed operation.

All operations are monitored on a large, four-digit LED display with mode indicators. Speed can be selected from the keyboard or the front panel knob (also used to adjust sidetone pitch). Adjust character formation speed and average sending speed together or independently. Practice code without disturbing others using the headphone jack and volume control. With nineteen weight settings, you can easily compensate for transmitter keying characteristics or give yourself a distinctive "fist."

With more usable features for your money than any other Morse keyboard, the KK-1 continues AEA's tradition of top-notch keyers.

Specifications for the KK-1

Character formation speed range	5 to 90 WPM
Average sending speed range	5 WPM to formation speed
Memory	Up to 12 message memories, dynamically allocated, nestable
Keying output	Positive to ground and grid-block
Serial numbers	1 to 9999
Message auto-repeat delay	1 to 99 seconds
Dot-dash ratio	Normal, plus 9 light and 9 heavy settings
Type ahead buffer size	255 characters
Total message capacity	7913 characters
Sidetone range	200-2500 Hz, continuously variable
Power requirement	10-16 VDC, 350 mA
Physical	
Dimensions	6.8" (173mm)W x 4.5" (114mm)D x 2.5" (64 mm)H
Weight	2 lbs (0.91 kg)

MM-3 Morse Machine

Break Those Tough-To-Crack Speed Barriers With The Ultimate Keyer/Trainer

This is the machine you need to break through those tough-to-crack code speed barriers with five easy-to-use training modes—including QSO simulator for realistic "rag chews"—without going on the air. Plus, a DX contest simulator is included to sharpen your competitive skills.

Whether you're an expert or novice, the Morse Machine has four ways to help you improve your skills in both sending and receiving:

- A proficiency trainer allows random code group practice with steadily increasing speed.
- Random word generator that randomly generates four-letter words for a more realistic practice session.
- QSO simulator. You can call and work simulated stations, answer a CQ, or just sit back and listen to hear realistic QSOs very much like those you hear on the air every day.
- DX contest simulator. Take part in a realistic DX contest, or just listen.

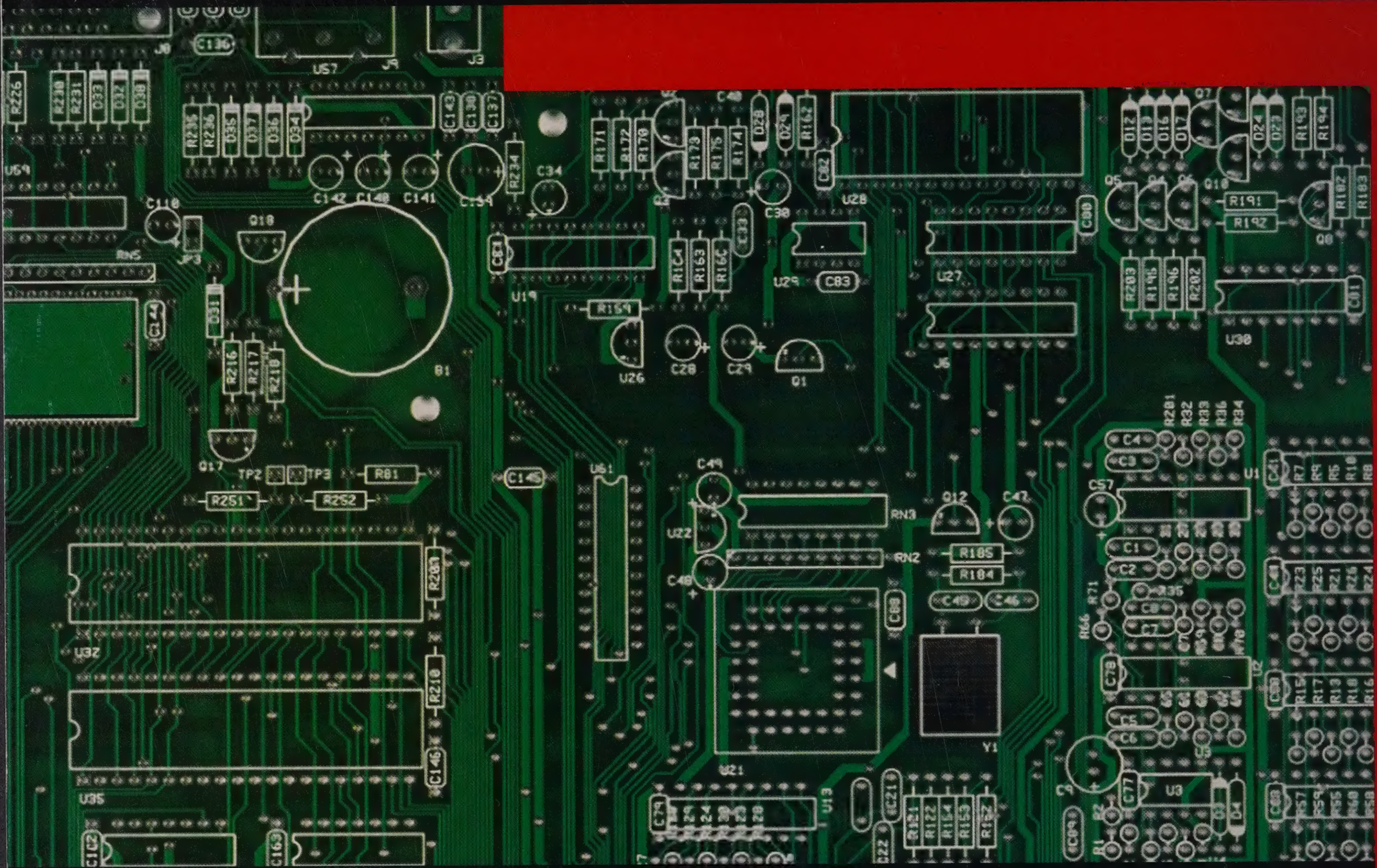
The Morse Machine is a full-featured keyer for the serious contester, with automatic serial number insertion and incrementing in any memory message. Use the front panel knob to adjust sending speed or enter a precise speed with the keypad. Speed up exchanges by having parts of your message sent at a higher speed. You can also add remote switches for four of the memories so you can instantly send your responses or call CQ.

AEA's MM-3 can also be programmed to be an automatic beacon that automatically repeats a message every 1-999 seconds.

Easy to customize! The Morse Machine's keypad offers an intuitive, easy-to-use method of quickly changing parameters to customize the MM-3 to meet your specific needs. Most commands are clearly labeled on the front panel so the manual is rarely necessary for normal operation.

Specifications for the MM-3

Speed range	2 to 99 (variable) or 2 to 255 (programmable) WPM
Memory	8,192 bytes Lithium battery backed Option: 32,768 bytes
Keying output	+50 V, 500mA max; -35V, 30mA max
Computer I/O	150 to 9600 baud, RS-232 compatible
Serial numbers	1 to 9,999 auto incrementing
Message auto-repeat delay	1 to 999 seconds
Increase speed time	0.1 to 59.9 minutes
Dot-dash memory on/off	Program selectable
Dot-space ratio	Programmable from 0.5 to 1.5
Dash-space ratio	Programmable from 2.0 to 4.0
Semi-automatic (bug) mode	Program selectable
Power requirement	+9 to +16 VDC @ 200mA
Physical	
Dimensions	7.4" (188mm)W x 4.75" (121mm)D x 1.9" (48mm)H
Weight	1.4 lbs (0.64 kg)



Advanced Electronic Applications, Inc.
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2006—196th Street SW
Lynnwood, WA 98036

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Upgrade Hotline	(206) 774-1722
Literature Request Line	(800) 432-8873
Fax	(206) 775-2340
Compuserve	76702,1013

To order, contact your favorite amateur radio equipment dealer.

All specifications subject to change without notice.